



**CFR 47 FCC PART 15 SUBPART C
ISED RSS-247 ISSUE 2**

CERTIFICATION TEST REPORT

For

Milo

MODEL NUMBER: M01

FCC ID: 2A6M9-MV01

IC: 28476-MV01

REPORT NUMBER: 4790371944-10

ISSUE DATE: July 18, 2022

Prepared for

**Loose Cannon Systems, Inc.
PO Box 1447, Ross, CA. 94957 USA**

Prepared by

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Revision History

Rev.	Issue Date	Revisions	Revised By
V0	07/18/2022	Initial Issue	



Summary of Test Results			
Clause	Test Items	FCC/ISED Rules	Test Results
1	20dB Bandwidth and 99% Occupied Bandwidth	FCC 15.247 (a)(1) (i) RSS-247 Clause 5.1 (c) RSS-Gen Clause 6.7	Pass
2	Conducted Output Power	FCC 15.247 (b) (2) RSS-247 Clause 5.4 (a)	Pass
3	Carrier Hopping Channel Separation	FCC 15.247 (a) (1) RSS-247 Clause 5.1 (c)	Pass
4	Number of Hopping Frequency	15.247 (a) (i) RSS-247 Clause 5.1 (c)	Pass
5	Time of Occupancy (Dwell Time)	15.247 (a) (i) RSS-247 Clause 5.1 (c)	Pass
6	Conducted Bandedge	FCC 15.247 (d) RSS-247 Clause 5.5	Pass
7	Radiated Bandedge and Spurious	FCC 15.247 (d) FCC 15.209 FCC 15.205 RSS-247 Clause 5.5 RSS-GEN Clause 8.9 RSS-GEN Clause 8.10	Pass
8	Conducted Emission Test for AC Power Port	FCC Part 15.207 RSS-GEN Clause 8.8	Pass
9	Antenna Requirement	FCC 15.203 RSS-GEN Clause 6.8	Pass
Note: 1. This test report is only published to and used by the applicant, and it is not for evidence purpose in China. 2. The measurement result for the sample received is <Pass> according to < CFR 47 FCC PART 15 SUBPART C >< ISED RSS-247 > when <Accuracy Method> decision rule is applied.			

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1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name: Loose Cannon Systems, Inc.
Address: PO Box 1447, Ross, CA. 94957 USA

Manufacturer Information

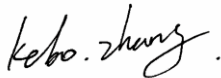
Company Name: Loose Cannon Systems, Inc.
Address: PO Box 1447, Ross, CA. 94957 USA

EUT Information

EUT Name: Milo
Model: M01
Brand: 
Sample Received Date: April 20, 2022
Sample Status: Normal
Sample ID: 4881135
Date of Tested: April 25, 2022~July 18, 2022

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 FCC PART 15 SUBPART C	PASS
ISED RSS-247 Issue 2	PASS
ISED RSS-GEN Issue 5	PASS

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with KDB 558074 D01 15.247 Meas Guidance v05r02, 414788 D01 Radiated Test Site v01r01, CFR 47 FCC Part 2, CFR 47 FCC Part 15, ANSI C63.10-2013, ISED RSS-247 Issue 2 and ISED RSS-GEN Issue 5.

3. FACILITIES AND ACCREDITATION

Accreditation Certificate	<p>A2LA (Certificate No.: 4102.01) UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been assessed and proved to be in compliance with A2LA.</p> <p>FCC (FCC Designation No.: CN1187) UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. Has been recognized to perform compliance testing on equipment subject to the Commission's Declaration of Conformity (DoC) and Certification rules</p> <p>ISED (Company No.: 21320) UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been registered and fully described in a report filed with ISED. Body Identifier (CABID) is CN0046.</p> <p>VCCI (Registration No.: G-20019, R-20004, C-20012 and T-20011) UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been assessed and proved to be in compliance with VCCI, the Membership No. is 3793. Facility Name: Chamber D, the VCCI registration No. is G-20019 and R-20004 Shielding Room B, the VCCI registration No. is C-20012 and T-20011</p>
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Note 1: All tests measurement facilities use to collect the measurement data are located at Building 10, Innovation Technology Park, Song Shan Lake Hi tech Development Zone, Dongguan, 523808, China

Note 2: The test anechoic chamber in UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch had been calibrated and compared to the open field sites and the test anechoic chamber is shown to be equivalent to or worst case from the open field site.

Note 3: For below 30 MHz, lab had performed measurements at test anechoic chamber and comparing to measurements obtained on an open field site. And these measurements below 30 MHz had been correlated to measurements performed on an OFS.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations and is traceable to recognized national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Test Item	Uncertainty
Conduction emission	3.62 dB
Radiated Emission (Included Fundamental Emission) (9 kHz ~ 30 MHz)	2.2 dB
Radiated Emission (Included Fundamental Emission) (30 MHz ~ 1 GHz)	4.00 dB
Radiated Emission (Included Fundamental Emission) (1 GHz to 26 GHz)	5.78 dB (1 GHz ~ 18 GHz)
	5.23 dB (18 GHz ~ 26 GHz)
Duty Cycle	±0.028%
20dB Emission Bandwidth and 99% Occupied Bandwidth	±0.0196%
Carrier Frequency Separation	±1.9%
Maximum Conducted Output Power	±0.743 dB
Number of Hopping Channel	±1.9%
Time of Occupancy	±0.028%
Conducted Band-edge Compliance	±1.328 dB
Conducted Unwanted Emissions In Non-restricted Frequency Bands	±0.746 dB (9 kHz ~ 1 GHz)
	±1.328dB (1 GHz ~ 26 GHz)
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	



5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

EUT Name	Milo
Model	M01
Power Supply	DC 5 V

Note: The product has 3 power supply modes: battery(DC 3.7 V), USB(DC 5 V), AC adapter, we had pre-scan for all the 3 modes, and only the worst data for DC 5 V supply are recorded in the report.

Modulation	Bit Rate	Operation Frequency	Number of Channels
2GFSK	250 kbps	903.975 MHz-926.025 MHz	50
	150 kbps	904.46 MHz-925.54 MHz	63
	75 kbps	904.2 MHz-925.8 MHz	109
	25 kbps	904.2 MHz-925.8 MHz	145

5.2. MAXIMUM PEAK OUTPUT POWER

Modulation	Bit Rate	Transmit Frequency Range	Maximum Peak Output Power (dBm)
2GFSK	250 kbps	903.975 MHz-926.025 MHz	26.37
	150 kbps	904.46 MHz-925.54 MHz	26.68
	75 kbps	904.2 MHz-925.8 MHz	26.36
	25 kbps	904.2 MHz-925.8 MHz	26.32



5.3. CHANNEL LIST

Channel List for 915 MHz 2GFSK/250 kbps									
Channel	Frequency (MHz)	Channel	Frequency (Mz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
11	903.975	21	908.475	31	912.975	41	917.475	51	921.975
12	904.425	22	908.925	32	913.425	42	917.925	52	922.425
13	904.875	23	909.375	33	913.875	43	918.375	53	922.875
14	905.325	24	909.825	34	914.325	44	918.825	54	923.325
15	905.775	25	910.275	35	914.775	45	919.275	55	923.775
16	906.225	26	910.725	36	915.225	46	919.725	56	924.225
17	906.675	27	911.175	37	915.675	47	920.175	57	924.675
18	907.125	28	911.625	38	916.125	48	920.625	58	925.125
19	907.575	29	912.075	39	916.575	49	921.075	59	925.575
20	908.025	30	912.525	40	917.025	50	921.525	60	926.025

Channel List for 915 MHz 2GFSK/150 kbps									
Channel	Frequency (MHz)	Channel	Frequency (Mz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
11	904.46	26	909.56	41	914.66	56	919.76	71	924.86
12	904.8	27	909.9	42	915	57	920.1	72	925.2
13	905.14	28	910.24	43	915.34	58	920.44	73	925.54
14	905.48	29	910.58	44	915.68	59	920.78	/	/
15	905.82	30	910.92	45	916.02	60	921.12	/	/
16	906.16	31	911.26	46	916.36	61	921.46	/	/
17	906.5	32	911.6	47	916.7	62	921.8	/	/
18	906.84	33	911.94	48	917.04	63	922.14	/	/
19	907.18	34	912.28	49	917.38	64	922.48	/	/
20	907.52	35	912.62	50	917.72	65	922.82	/	/
21	907.86	36	912.96	51	918.06	66	923.16	/	/
22	908.2	37	913.3	52	918.4	67	923.5	/	/
23	908.54	38	913.64	53	918.74	68	923.84	/	/
24	908.88	39	913.98	54	919.08	69	924.18	/	/
25	909.22	40	914.32	55	919.42	70	924.52	/	/



Channel List for 915 MHz 2GFSK/75 kbps									
Channel	Frequency (MHz)	Channel	Frequency (Mz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
11	904.2	33	908.6	55	913	77	917.4	99	921.8
12	904.4	34	908.8	56	913.2	78	917.6	100	922
13	904.6	35	909	57	913.4	79	917.8	101	922.2
14	904.8	36	909.2	58	913.6	80	918	102	922.4
15	905	37	909.4	59	913.8	81	918.2	103	922.6
16	905.2	38	909.6	60	914	82	918.4	104	922.8
17	905.4	39	909.8	61	914.2	83	918.6	105	923
18	905.6	40	910	62	914.4	84	918.8	106	923.2
19	905.8	41	910.2	63	914.6	85	919	107	923.4
20	906	42	910.4	64	914.8	86	919.2	108	923.6
21	906.2	43	910.6	65	915	87	919.4	109	923.8
22	906.4	44	910.8	66	915.2	88	919.6	110	924
23	906.6	45	911	67	915.4	89	919.8	111	924.2
24	906.8	46	911.2	68	915.6	90	920	112	924.4
25	907	47	911.4	69	915.8	91	920.2	113	924.6
26	907.2	48	911.6	70	916	92	920.4	114	924.8
27	907.4	49	911.8	71	916.2	93	920.6	115	925
28	907.6	50	912	72	916.4	94	920.8	116	925.2
29	907.8	51	912.2	73	916.6	95	921	117	925.4
30	908	52	912.4	74	916.8	96	921.2	118	925.6
31	908.2	53	912.6	75	917	97	921.4	119	925.8
32	908.4	54	912.8	76	917.2	98	921.6	/	/



Channel List for 915 MHz 2GFSK/25 kbps									
Channel	Frequency (MHz)	Channel	Frequency (Mz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
11	904.2	40	908.55	69	912.9	98	917.25	127	921.6
12	904.35	41	908.7	70	913.05	99	917.4	128	921.75
13	904.5	42	908.85	71	913.2	100	917.55	129	921.9
14	904.65	43	909	72	913.35	101	917.7	130	922.05
15	904.8	44	909.15	73	913.5	102	917.85	131	922.2
16	904.95	45	909.3	74	913.65	103	918	132	922.35
17	905.1	46	909.45	75	913.8	104	918.15	133	922.5
18	905.25	47	909.6	76	913.95	105	918.3	134	922.65
19	905.4	48	909.75	77	914.1	106	918.45	135	922.8
20	905.55	49	909.9	78	914.25	107	918.6	136	922.95
21	905.7	50	910.05	79	914.4	108	918.75	137	923.1
22	905.85	51	910.2	80	914.55	109	918.9	138	923.25
23	906	52	910.35	81	914.7	110	919.05	139	923.4
24	906.15	53	910.5	82	914.85	111	919.2	140	923.55
25	906.3	54	910.65	83	915	112	919.35	141	923.7
26	906.45	55	910.8	84	915.15	113	919.5	142	923.85
27	906.6	56	910.95	85	915.3	114	919.65	143	924
28	906.75	57	911.1	86	915.45	115	919.8	144	924.15
29	906.9	58	911.25	87	915.6	116	919.95	145	924.3
30	907.05	59	911.4	88	915.75	117	920.1	146	924.45
31	907.2	60	911.55	89	915.9	118	920.25	147	924.6
32	907.35	61	911.7	90	916.05	119	920.4	148	924.75
33	907.5	62	911.85	91	916.2	120	920.55	149	924.9
34	907.65	63	912	92	916.35	121	920.7	150	925.05
35	907.8	64	912.15	93	916.5	122	920.85	151	925.2
36	907.95	65	912.3	94	916.65	123	921	152	925.35
37	908.1	66	912.45	95	916.8	124	921.15	153	925.5
38	908.25	67	912.6	96	916.95	125	921.3	154	925.65
39	908.4	68	912.75	97	917.1	126	921.45	155	925.8



5.4. EST CHANNEL CONFIGURATION

Test Mode	Test Channel	Frequency
2GFSK-250 kbps	CH 11(Low Channel), CH 35(MID Channel), CH 60(High Channel)	903.975 MHz, 914.775 MHz, 926.025 MHz
2GFSK-150 kbps	CH 11(Low Channel), CH 42(MID Channel), CH 73(High Channel)	904.46 MHz, 915 MHz, 925.54 MHz
2GFSK-75 kbps	CH 11(Low Channel), CH 65(MID Channel), CH 119(High Channel)	904.2 MHz, 915 MHz, 925.8 MHz
2GFSK-25 kbps	CH 11(Low Channel), CH 83(MID Channel), CH 155(High Channel)	904.2 MHz, 915 MHz, 925.8 MHz



5.5. THE WORSE CASE POWER SETTING PARAMETER

The Worse Case Power Setting Parameter under 902 ~ 928MHz Band				
Test Software		Yukon		
Modulation Mode	Transmit Antenna Number	Test Channel		
		LCH	MCH	HCH
2GFSK-250 kbps	1	Default	Default	Default
2GFSK-150 kbps	1	Default	Default	Default
2GFSK-75 kbps	1	Default	Default	Default
2GFSK-25 kbps	1	Default	Default	Default



5.6. DESCRIPTION OF AVAILABLE ANTENNAS

Antenna	Frequency Band (MHz)	Antenna Type	MAX Antenna Gain (dBi)
1	902-928	Inverted F	-1.15

Modulation	Transmit and Receive Mode	Description
2GFSK-250 kbps	<input checked="" type="checkbox"/> 1TX, 1RX	Antenna 1 can be used as transmitting/receiving antenna.
2GFSK-150 kbps	<input checked="" type="checkbox"/> 1TX, 1RX	Antenna 1 can be used as transmitting/receiving antenna.
2GFSK-75 kbps	<input checked="" type="checkbox"/> 1TX, 1RX	Antenna 1 can be used as transmitting/receiving antenna.
2GFSK-25 kbps	<input checked="" type="checkbox"/> 1TX, 1RX	Antenna 1 can be used as transmitting/receiving antenna.

Note: The value of the antenna gain was declared by customer.



5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Item	Equipment	Brand Name	Model Name	P/N	Remarks
1	PC	Dell	Vostro 3902	8KNDDDB2	/
2	USB TO UART	/	/	/	/
3	AC Adapter	/	HW-100225C00	/	Input: AC 100-240V, 50/60Hz, 0.75A Output: DC 5V, 2A

I/O PORT

Cable No	Port	Connector Type	Cable Type	Cable Length(m)	Remarks
1	USB	/	/	1.0	/

ACCESSORY

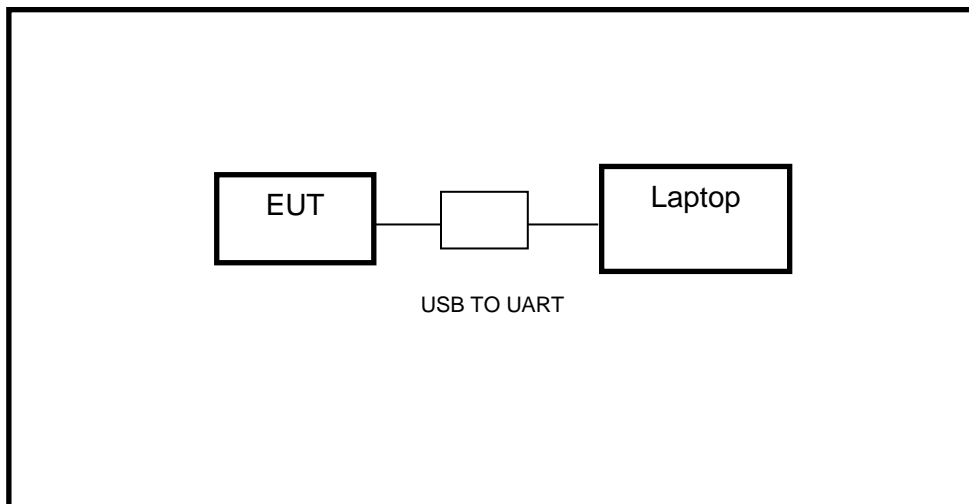
Item	Accessory	Brand Name	Model Name	Description
/	/	/	/	/

TEST SETUP

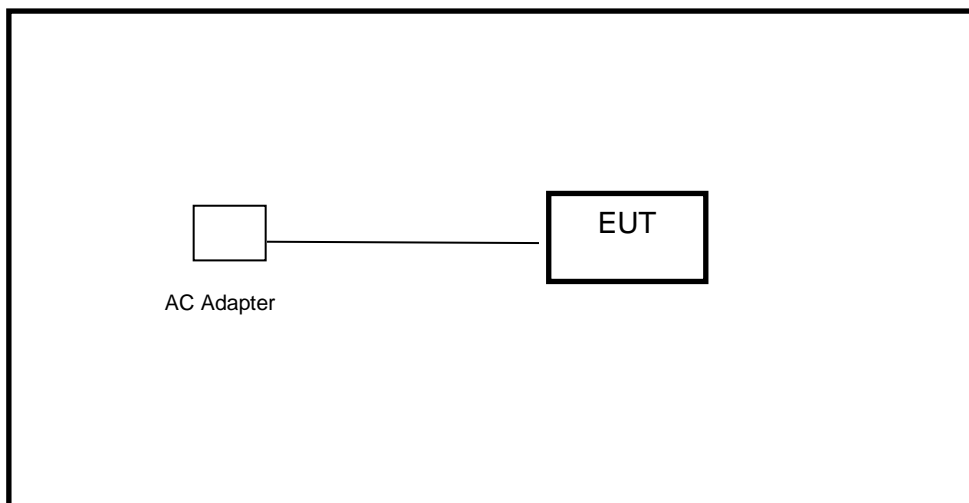
The EUT can work in engineering mode with a software through a Laptop.

SETUP DIAGRAM FOR TESTS

For others:



For AC POWER LINE CONDUCTED EMISSIONS only:





6. MEASURING INSTRUMENT AND

Conducted Emissions					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due Date
EMI Test Receiver	R&S	ESR3	101961	Oct.30, 2021	Oct.29, 2022
Two-Line V-Network	R&S	ENV216	101983	Oct.30, 2021	Oct.29, 2022
Software					
Description			Manufacturer	Name	Version
Test Software for Conducted Emissions			Farad	EZ-EMC	Ver. UL-3A1

Radiated Emissions					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due Date
MXE EMI Receiver	KESIGHT	N9038A	MY56400036	Oct.30, 2021	Oct.29, 2022
Hybrid Log Periodic Antenna	TDK	HLP-3003C	130959	Aug.02, 2021	Aug.01, 2024
Preamplifier	HP	8447D	2944A09099	Oct.30, 2021	Oct.29, 2022
EMI Measurement Receiver	R&S	ESR26	101377	Oct.30, 2021	Oct.29, 2022
Horn Antenna	TDK	HRN-0118	130940	July 20, 2021	July 19, 2024
Preamplifier	TDK	PA-02-0118	TRS-305-00067	Oct.30, 2021	Oct.29, 2022
Horn Antenna	Schwarzbeck	BBHA9170	697	July 20, 2021	July 19, 2024
Preamplifier	TDK	PA-02-2	TRS-307-00003	Oct.31, 2021	Oct.30, 2022
Preamplifier	TDK	PA-02-3	TRS-308-00002	Oct.31, 2021	Oct.30, 2022
Loop antenna	Schwarzbeck	1519B	00008	Dec.14, 2021	Dec.13, 2024
Preamplifier	TDK	PA-02-001-3000	TRS-302-00050	Oct.31, 2021	Oct.30, 2022
Preamplifier	Mini-Circuits	ZX60-83LN-S+	SUP01201941	Oct.31, 2021	Oct.30, 2022
High Pass Filter	Wi	WHKX10-2700-3000-18000-40SS	23	Oct.31, 2021	Oct.30, 2022
Band Reject Filter	Wainwright	WRCJV8-2350-2400-2483.5-2533.5-40SS	4	Oct.31, 2021	Oct.30, 2022
Software					
Description			Manufacturer	Name	Version
Test Software for Radiated Emissions			Farad	EZ-EMC	Ver. UL-3A1



Tonsend RF Test System					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due. Date
PXA Signal Analyzer	Keysight	N9030A	MY55410512	Oct.30, 2021	Oct.29, 2022
Signal Analyzer	R&S	FSV40	101118	Oct.30, 2021	Oct.29, 2022
MXG Vector Signal Generator	Keysight	N5182B	MY56200284	Oct.30, 2021	Oct.29, 2022
MXG Vector Signal Generator	Keysight	N5172B	MY56200301	Oct.30, 2021	Oct.29, 2022
Software					
Description	Manufacturer	Name		Version	
Tonsend SRD Test System	Tonsend	JS1120-3 RF Test System		2.6.77.0518	

Other Instruments					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Dual Channel Power Meter	Keysight	N1912A	MY55416024	Oct.30, 2021	Oct.29, 2022
Power Sensor	Keysight	USB Wideband Power Sensor	MY5100022	Oct.30, 2021	Oct.29, 2022
Signal Analyzer	R&S	FSV40	101118	Oct.30, 2021	Oct.29, 2022

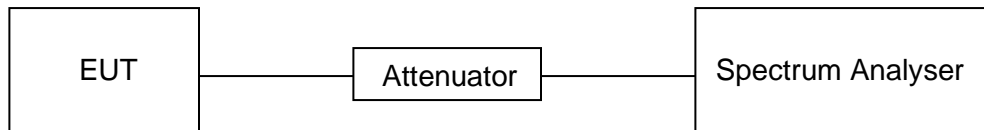
7. ANTENNA PORT TEST RESULTS

7.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

TEST SETUP



TEST ENVIRONMENT

Temperature	23.3 °C	Relative Humidity	62.1 %
Atmosphere Pressure	101 kPa	Test Voltage	DC 5 V

PROCEDURE

Refer to ANSI C63.10-2013 Zero – Span Spectrum Analyzer method.

RESULTS

Please refer to appendix A.



7.2. 20 dB BANDWIDTH AND 99 % OCCUPIED BANDWIDTH

LIMITS

CFR 47FCC Part15 (15.247) Subpart C ISED RSS-247 ISSUE 2			
Section	Test Item	Limit	Frequency Range (MHz)
CFR 47 FCC 15.247 (a)(1) (i) RSS-247 Clause 5.1 (a)	20 dB Bandwidth	500 kHz	902 - 928
ISED RSS-Gen Clause 6.7	99 % Occupied Bandwidth	None; for reporting purposes only.	902 - 928

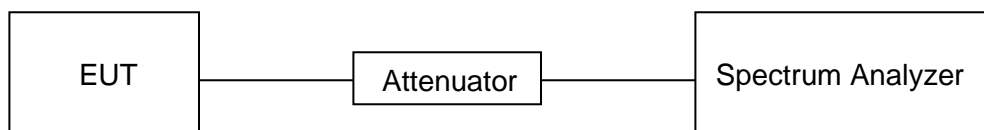
TEST PROCEDURE

Connect the EUT to the spectrum analyser and use the following settings:

Center Frequency	The center frequency of the channel under test
Detector	Peak
RBW	For 20 dB Bandwidth: 1 % to 5 % of the 20 dB bandwidth For 99 % Occupied Bandwidth: 1 % to 5 % of the occupied bandwidth
VBW	For 20 dB Bandwidth: approximately 3×RBW For 99 % Occupied Bandwidth: $\geq 3 \times \text{RBW}$
Span	Approximately 2 to 3 times the 20dB bandwidth
Trace	Max hold
Sweep	Auto couple

a) Use the occupied bandwidth function of the instrument, allow the trace to stabilize and report the measured 99 % occupied bandwidth and 20 dB Bandwidth.

TEST SETUP





TEST ENVIRONMENT

Temperature	23.3 °C	Relative Humidity	62.1 %
Atmosphere Pressure	101 kPa	Test Voltage	DC 5 V

RESULTS

Please refer to appendix B.



7.3. CONDUCTED OUTPUT POWER

LIMITS

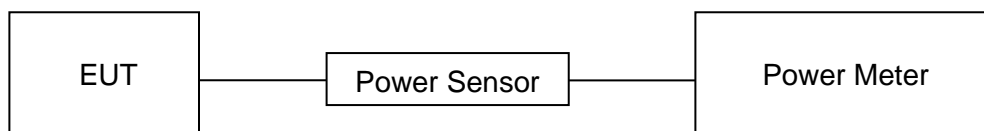
CFR 47 FCC Part15 (15.247), Subpart C ISED RSS-247 ISSUE 2			
Section	Test Item	Limit	Frequency Range (MHz)
CFR 47 FCC 15.247 (b) (2) ISED RSS-247 Clause 5.4 (a)	Peak Conducted Output Power	1 watt for systems employing at least 50 hopping channels	902 - 928

TEST PROCEDURE

Connect the EUT to a low loss RF cable from the antenna port to the power sensor (video bandwidth is greater than the occupied bandwidth).

Measure peak emission level, the indicated level is the peak output power, after any corrections for external attenuators and cables.

TEST SETUP



TEST ENVIRONMENT

Temperature	23.3 °C	Relative Humidity	62.1 %
Atmosphere Pressure	101 kPa	Test Voltage	DC 5 V

RESULTS

Please refer to appendix C.

7.4. CARRIER FREQUENCY SEPARATION

LIMITS

CFR 47 FCC Part15 (15.247), Subpart C ISSED RSS-247 ISSUE 2			
Section	Test Item	Limit	Frequency Range (MHz)
CFR 47 FCC 15.247 (a) (1) ISED RSS-247 Clause 5.1 (b)	Carrier Frequency Separation	Minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.	902 - 928

TEST PROCEDURE

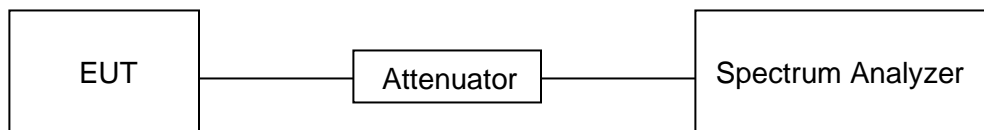
Connect the EUT to the spectrum analyzer and use the following settings:

Center Frequency	The center frequency of the channel under test
Span	wide enough to capture the peaks of two adjacent channels
Detector	Peak
RBW	Start with the RBW set to approximately 30 % of the channel spacing; adjust as necessary to best identify the center of each individual channel.
VBW	≥RBW
Trace	Max hold
Sweep time	Auto couple

Allow the trace to stabilize and use the marker-delta function to determine the separation between the peaks of the adjacent channels.

Compliance of an EUT with the appropriate regulatory limit shall be determined.

TEST SETUP





TEST ENVIRONMENT

Temperature	23.3 °C	Relative Humidity	62.1 %
Atmosphere Pressure	101 kPa	Test Voltage	DC 5 V

RESULTS

Please refer to Appendix D.

7.5. NUMBER OF HOPPING FREQUENCIES

LIMITS

CFR 47 FCC Part15 (15.247), Subpart C ISED RSS-247 ISSUE 2		
Section	Test Item	Limit
CFR 47 15.247 (a) (i) ISED RSS-247 Clause 5.1 (c)	Number of Hopping Frequency	1. if the 20 dB bandwidth of the hopping channel is less than 250 kHz, at least 50 hopping channels 2. if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, at least 25 hopping channels

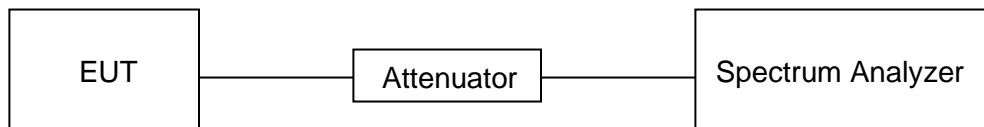
TEST PROCEDURE

Connect the EUT to the spectrum Analyzer and use the following settings:

Detector	Peak
RBW	To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.
VBW	\geq RBW
Span	The frequency band of operation. Depending on the number of channels the device supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.
Trace	Max hold
Sweep time	Auto couple

Set EUT to transmit maximum output power and switch on frequency hopping function. then set enough count time (larger than 5000 times) to get all the hopping frequency channel displayed on the screen of spectrum analyzer, count the quantity of peaks to get the number of hopping channels.

TEST SETUP





TEST ENVIRONMENT

Temperature	23.3 °C	Relative Humidity	62.1 %
Atmosphere Pressure	101 kPa	Test Voltage	DC 5 V

RESULTS

Please refer to appendix E.

7.6. TIME OF OCCUPANCY (DWELL TIME)

LIMITS

CFR 47 FCC Part15 (15.247), Subpart C ISED RSS-247 ISSUE 2		
Section	Test Item	Limit
CFR 47 15.247 (a) (i) ISED RSS-247 Clause 5.1 (c)	Time of Occupancy (Dwell Time)	1.If the 20 dB bandwidth of the hopping channel is less than 250 kHz, the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period. 2. if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period.

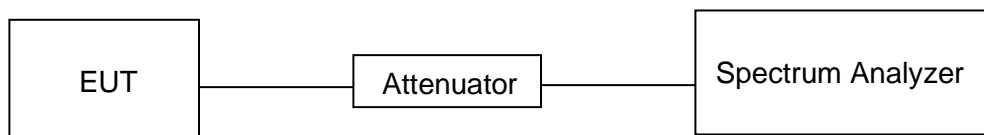
TEST PROCEDURE

Connect the EUT to the spectrum Analyzer and use the following settings:

Center Frequency	The center frequency of the channel under test
Detector	Peak
RBW	\leq channel spacing and where possible RBW should be set $\gg 1 / T$, where T is the expected dwell time per channel.
VBW	\geq RBW
Span	Zero span, centered on a hopping channel
Trace	Max hold
Sweep time	As necessary to capture the entire dwell time per hopping channel; where possible use a video trigger and trigger delay so that the transmitted signal starts a little to the right of the start of the plot. The trigger level might need slight adjustment to prevent triggering when the system hops on an adjacent channel

- The transmitter output (antenna port) was connected to the spectrum analyzer
- Set RBW of spectrum analyzer to 1MHz and VBW to 1MHz.
- Use a video trigger with the trigger level set to enable triggering only on full pulses.
- Sweep Time is more than once pulse time.
- Set the center frequency on any frequency would be measure and set the frequency span to zero span.
- Measure the maximum time duration of one single pulse.
- Measure the maximum time duration of one single pulse.
A Period Time = (channel number)*0.4

TEST SETUP



**TEST ENVIRONMENT**

Temperature	23.3 °C	Relative Humidity	62.1 %
Atmosphere Pressure	101 kPa	Test Voltage	DC 5 V

RESULTS

Please refer to appendix F.

7.7. CONDUCTED BANDEDGE AND SPURIOUS EMISSION

LIMITS

CFR 47 FCC Part15 (15.247), Subpart C ISED RSS-247 ISSUE 2		
Section	Test Item	Limit
CFR 47 FCC §15.247 (d) ISED RSS-247 5.5	Conducted Spurious Emission	at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power

TEST PROCEDURE

Connect the EUT to the spectrum analyser and use the following settings for reference level measurement:

Center Frequency	The center frequency of the channel under test
Detector	Peak
RBW	100 kHz
VBW	$\geq 3 \times \text{RBW}$
Span	1.5 x DTS bandwidth
Trace	Max hold
Sweep time	Auto couple.

Allow trace to fully stabilize and use the peak marker function to determine the maximum PSD level.

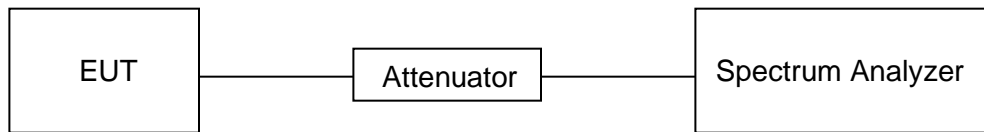
Change the settings for emission level measurement:

Span	Set the center frequency and span to encompass frequency range to be measured
Detector	Peak
RBW	100 kHz
VBW	$\geq 3 \times \text{RBW}$
measurement points	$\geq \text{span}/\text{RBW}$
Trace	Max hold
Sweep time	Auto couple.

Allow trace to fully stabilize and use the peak marker function to determine the maximum PSD level. Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) is attenuated by at least the minimum requirements.



TEST SETUP



TEST ENVIRONMENT

Temperature	23.3 °C	Relative Humidity	62.1 %
Atmosphere Pressure	101 kPa	Test Voltage	DC 5 V

RESULTS

Please refer to appendix G.



8. RADIATED TEST RESULTS

LIMITS

Please refer to CFR 47 FCC §15.205 and §15.209.

Please refer to ISSED RSS-GEN Clause 8.9 and Clause 8.10.

Radiation Disturbance Test Limit for FCC (Class B) (9 kHz-1 GHz)

Emissions radiated outside of the specified frequency bands above 30 MHz			
Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m	
		Quasi-Peak	
30 - 88	100	40	
88 - 216	150	43.5	
216 - 960	200	46	
Above 960	500	54	
Above 1000	500	Peak	Average
		74	54

FCC Emissions radiated outside of the specified frequency bands below 30 MHz		
Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30

ISED General field strength limits at frequencies below 30 MHz

Table 6 – General field strength limits at frequencies below 30 MHz		
Frequency	Magnetic field strength (H-Field) (μA/m)	Measurement distance (m)
9 - 490 kHz ^{Note 1}	6.37/F (F in kHz)	300
490 - 1705 kHz	63.7/F (F in kHz)	30
1.705 - 30 MHz	0.08	30

Note 1: The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.



ISED Restricted bands please refer to ISED RSS-GEN Clause 8.10

MHz	MHz	GHz
0.090 - 0.110	149.9 - 150.05	9.0 - 9.2
0.495 - 0.505	156.52475 - 156.52525	9.3 - 9.5
2.1735 - 2.1905	156.7 - 156.9	10.6 - 12.7
3.020 - 3.026	162.0125 - 167.17	13.25 - 13.4
4.125 - 4.128	167.72 - 173.2	14.47 - 14.5
4.17725 - 4.17775	240 - 285	15.35 - 16.2
4.20725 - 4.20775	322 - 335.4	17.7 - 21.4
5.677 - 5.683	399.9 - 410	22.01 - 23.12
6.215 - 6.218	608 - 614	23.6 - 24.0
6.26775 - 6.26825	960 - 1427	31.2 - 31.8
6.31175 - 6.31225	1435 - 1626.5	36.43 - 36.5
8.291 - 8.294	1645.5 - 1646.5	Above 38.6
8.362 - 8.366	1660 - 1710	
8.37625 - 8.38675	1718.8 - 1722.2	
8.41425 - 8.41475	2200 - 2300	
12.29 - 12.293	2310 - 2390	
12.51975 - 12.52025	2483.5 - 2500	
12.57675 - 12.57725	2655 - 2900	
13.36 - 13.41	3260 - 3267	
16.42 - 16.423	3332 - 3339	
16.69475 - 16.69525	3345.8 - 3358	
16.80425 - 16.80475	3500 - 4400	
25.5 - 25.67	4500 - 5150	
37.5 - 38.25	5350 - 5400	
73 - 74.6	7250 - 7750	
74.8 - 75.2	8025 - 8500	
108 - 138		

Note 1: Certain frequency bands listed in table 7 and in bands above 38.6 GHz are designated for licence-exempt applications. These frequency bands and the requirements that apply to related devices are set out in the 200 and 300 series of RSSs.

FCC Restricted bands of operation refer to FCC §15.205 (a):

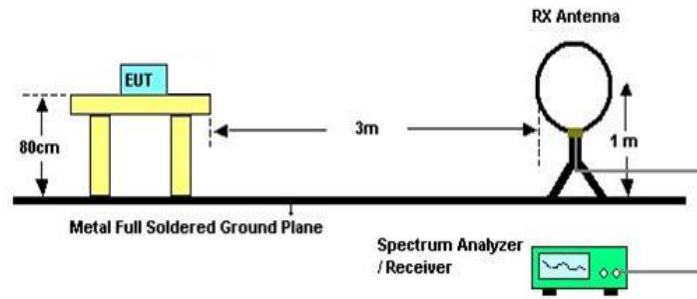
MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
¹ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(²)
13.36-13.41			

Note: ¹Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

²Above 38.6c

TEST SETUP AND PROCEDURE

Below 30 MHz

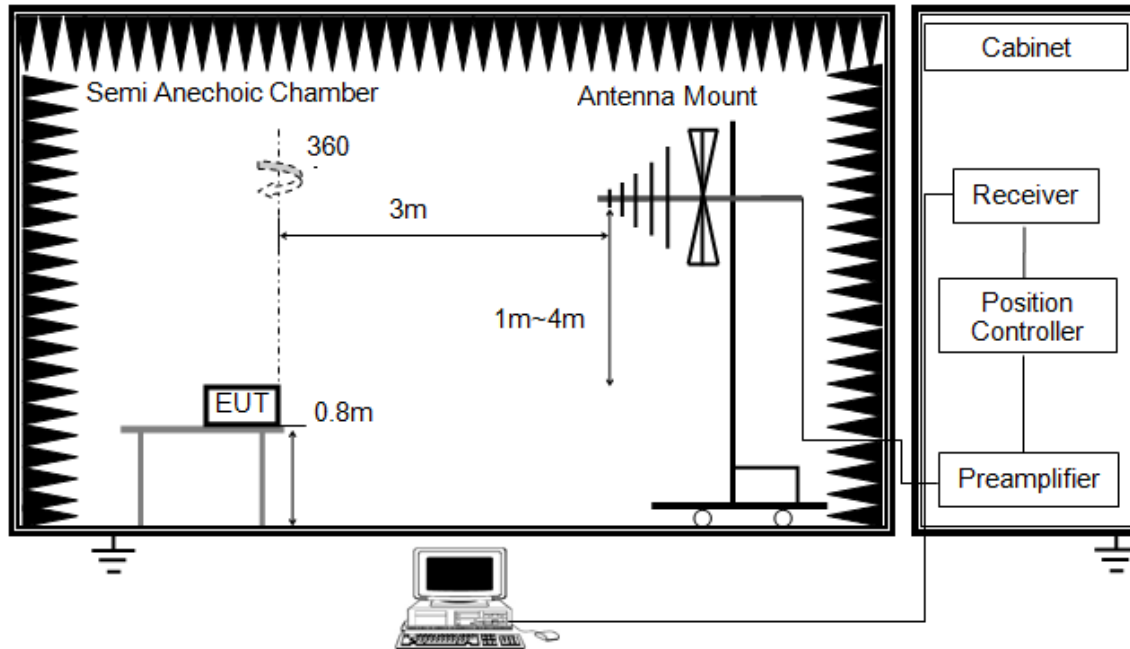


The setting of the spectrum analyser

RBW	200 Hz (From 9 kHz to 0.15 MHz)/ 9 kHz (From 0.15 MHz to 30 MHz)
VBW	200 Hz (From 9 kHz to 0.15 MHz)/ 9 kHz (From 0.15 MHz to 30 MHz)
Sweep	Auto
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013 clause 6.4.
2. The EUT was arranged to its worst case and then turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both Horizontal, Face-on and Face-off polarizations of the antenna are set to make the measurement.
3. The EUT was placed on a turntable with 80 cm above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a 1 m height antenna tower.
5. The radiated emission limits are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
6. For measurement below 1 GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak and average detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak and average detector and reported.
7. Although these tests were performed other than open field site, adequate comparison measurements were confirmed against 30m open field site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field site based on KDB 414788.
8. The limits in CFR 47, Part 15, Subpart C, paragraph 15.209 (a), are identical to those in RSS-GEN Section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377Ω . For example, the measurement frequency X KHz resulted in a level of Y dBuV/m, which is equivalent to $Y-51.5 = Z$ dBuA/m, which has the same margin, W dB, to the corresponding RSS-GEN Table 6 limit as it has to be 15.209(a) limit.

Below 1 GHz and above 30 MHz

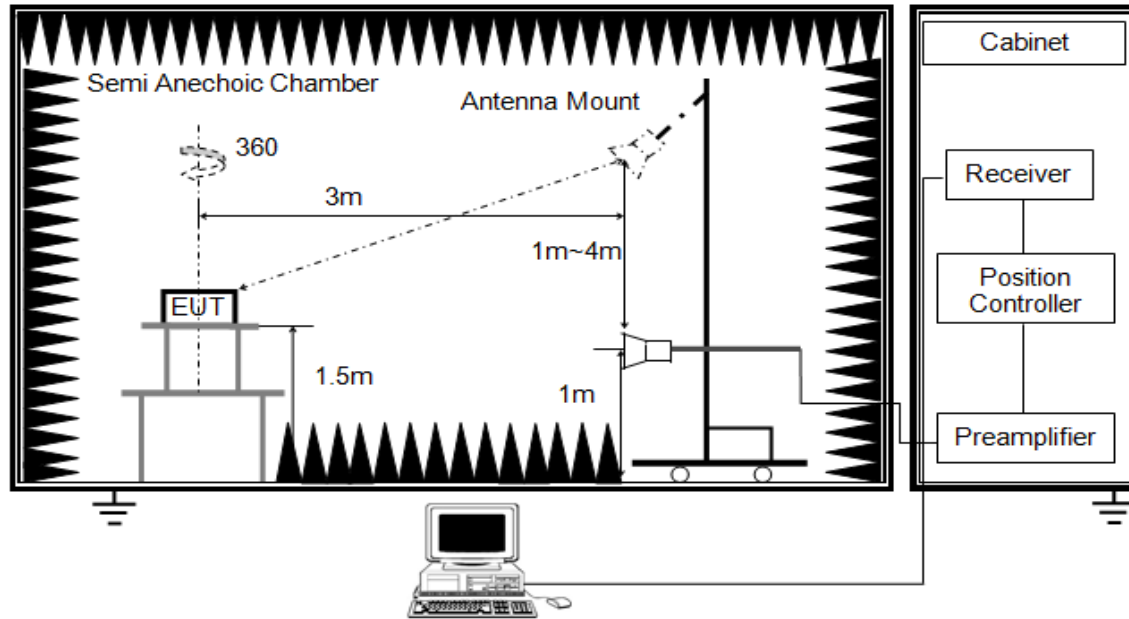


The setting of the spectrum analyser

RBW	120 kHz
VBW	300 kHz
Sweep	Auto
Detector	Peak/QP
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013 clause 6.5.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
3. The EUT was placed on a turntable with 80 cm above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. For measurement below 1 GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

Above 1 GHz

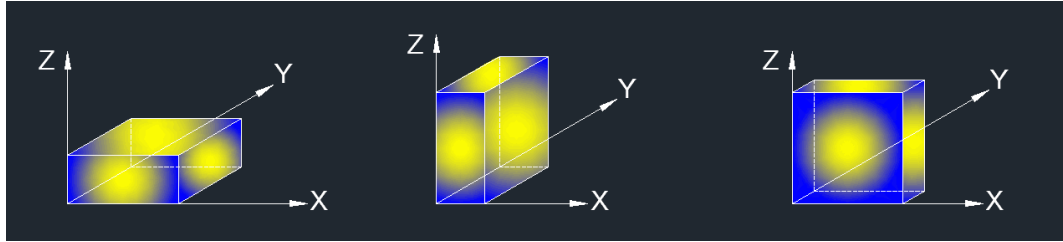


The setting of the spectrum analyser

RBW	1 MHz
VBW	PEAK: 3 MHz AVG: see note 6
Sweep	Auto
Detector	Peak
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013 clause 6.6.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
3. The EUT was placed on a turntable with 1.5 m above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. For measurement above 1 GHz, the emission measurement will be measured by the peak detector. This peak level, once corrected, must comply with the limit specified in Section 15.209.
6. For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 1/T video bandwidth with peak detector for average measurements. For the Duty Cycle please refer to clause 7.1.ON TIME AND DUTY CYCLE.

X axis, Y axis, Z axis positions:



Note 1: For all radiated test, EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

Note 2: The EUT was fully exercised with external accessories during the test. In the case of multiple accessory external ports, an external accessory shall be connected to one of each type of port.

TEST ENVIRONMENT

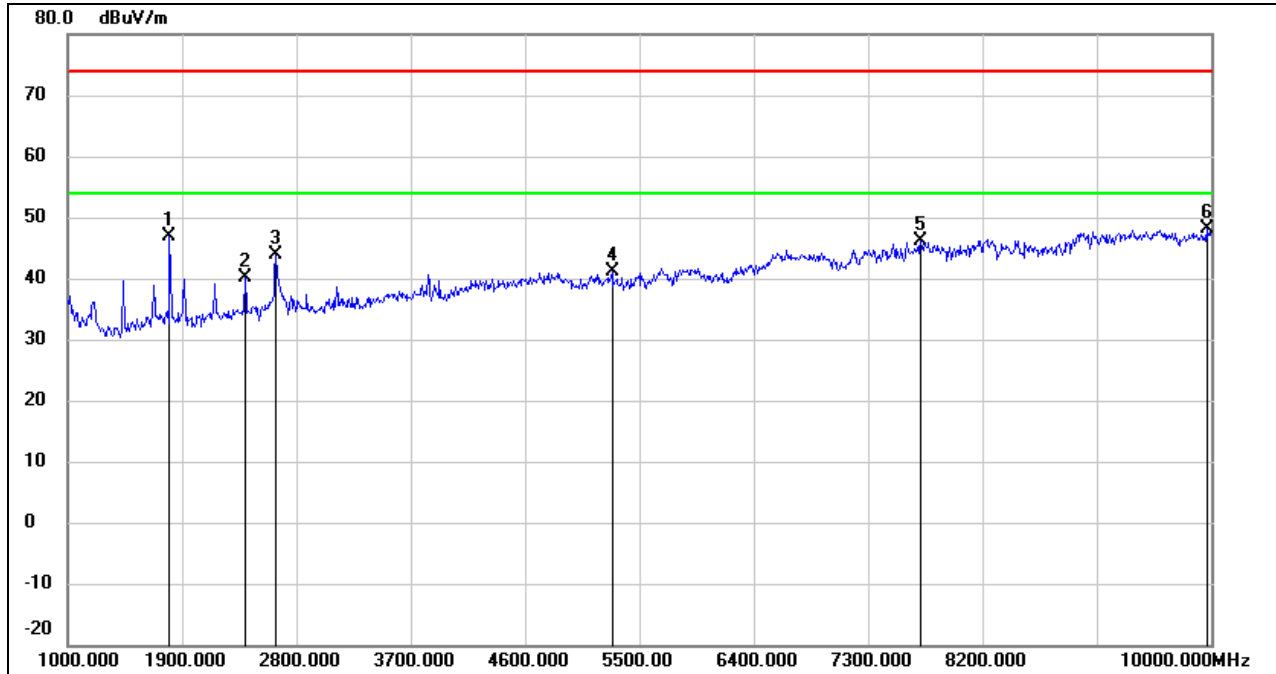
Temperature	24.4 °C	Relative Humidity	61.1 %
Atmosphere Pressure	101 kPa	Test Voltage	DC 5 V

RESULTS

8.1. SPURIOUS EMISSIONS (1 GHz ~ 10 GHz)

8.1.1. 2GFSK - 25 kbps MODE

HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1801.000	57.50	-10.58	46.92	74.00	-27.08	peak
2	2395.000	49.05	-8.96	40.09	74.00	-33.91	peak
3	2638.000	52.26	-8.39	43.87	74.00	-30.13	peak
4	5284.000	41.06	0.16	41.22	74.00	-32.78	peak
5	7714.000	40.37	5.81	46.18	74.00	-27.82	peak
6	9964.000	37.62	10.48	48.10	74.00	-25.90	peak

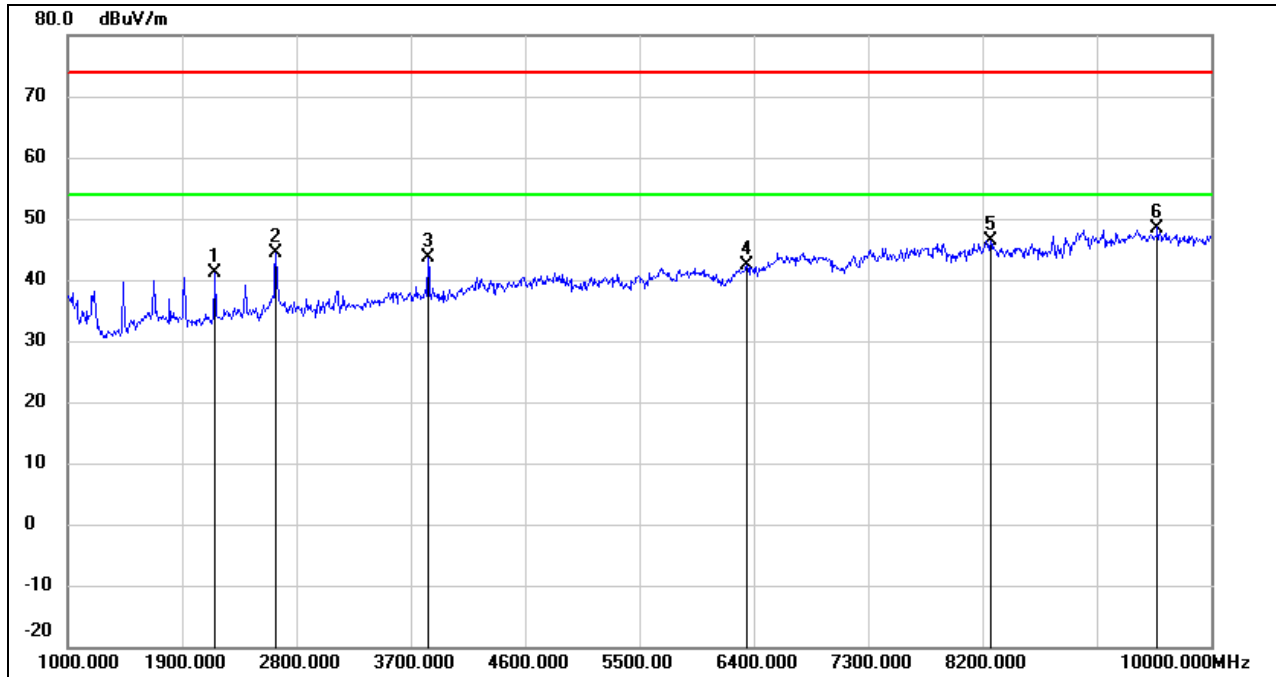
Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2161.000	51.19	-9.96	41.23	74.00	-32.77	peak
2	2638.000	52.83	-8.39	44.44	74.00	-29.56	peak
3	3835.000	48.06	-4.39	43.67	74.00	-30.33	peak
4	6346.000	40.24	2.22	42.46	74.00	-31.54	peak
5	8263.000	39.40	7.04	46.44	74.00	-27.56	peak
6	9577.000	38.41	10.09	48.50	74.00	-25.50	peak

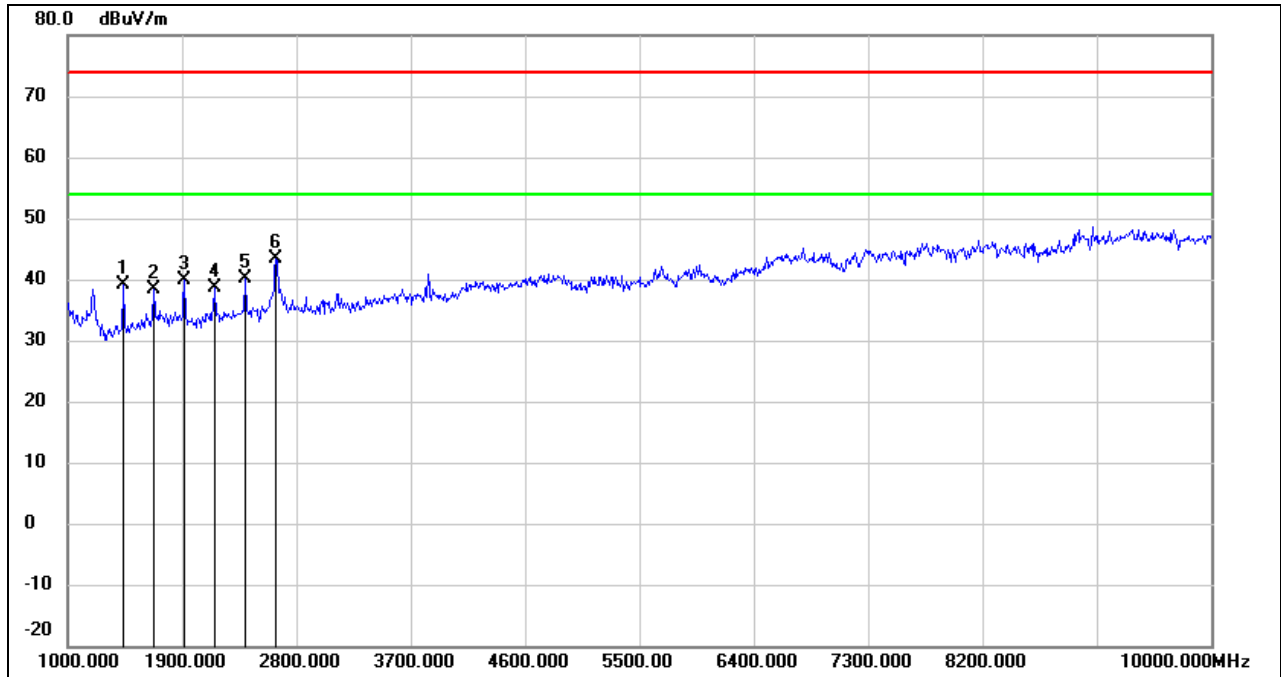
Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1441.000	51.94	-12.79	39.15	74.00	-34.85	peak
2	1675.000	49.78	-11.37	38.41	74.00	-35.59	peak
3	1918.000	50.64	-10.81	39.83	74.00	-34.17	peak
4	2161.000	48.68	-9.96	38.72	74.00	-35.28	peak
5	2395.000	49.11	-8.96	40.15	74.00	-33.85	peak
6	2638.000	51.75	-8.39	43.36	74.00	-30.64	peak

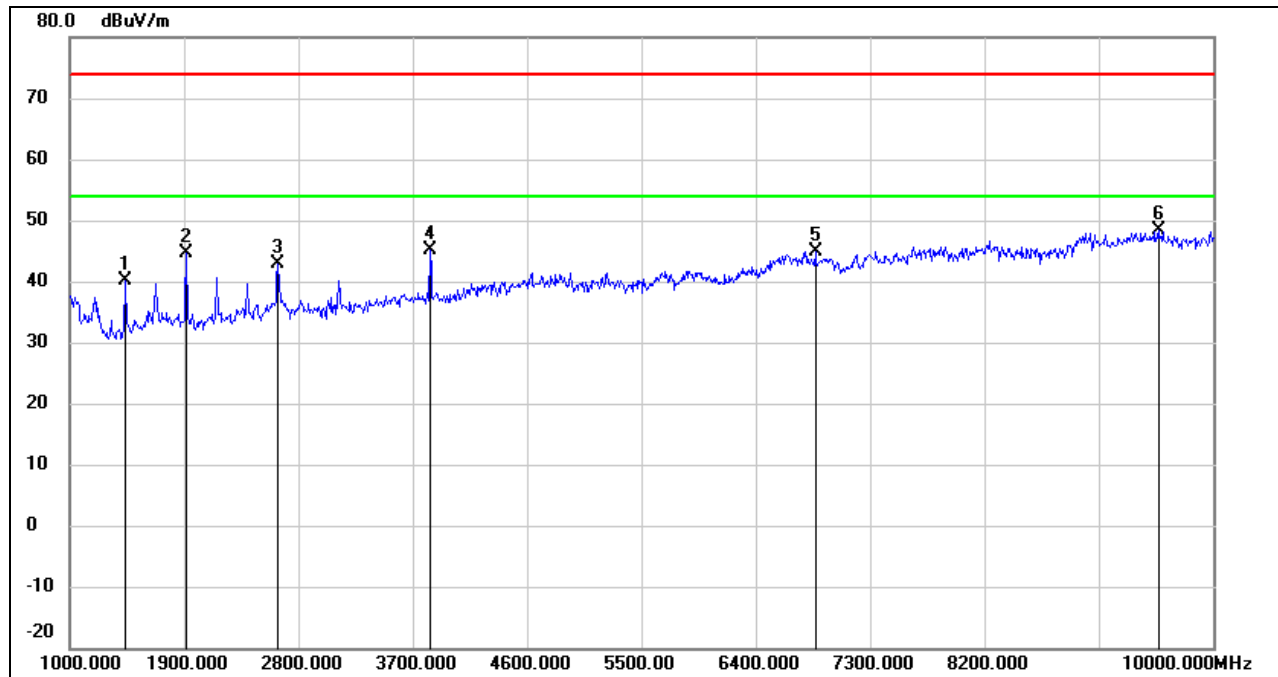
Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1441.000	52.89	-12.79	40.10	74.00	-33.90	peak
2	1918.000	55.34	-10.81	44.53	74.00	-29.47	peak
3	2638.000	51.27	-8.39	42.88	74.00	-31.12	peak
4	3835.000	49.41	-4.39	45.02	74.00	-28.98	peak
5	6868.000	41.03	3.95	44.98	74.00	-29.02	peak
6	9568.000	38.23	10.07	48.30	74.00	-25.70	peak

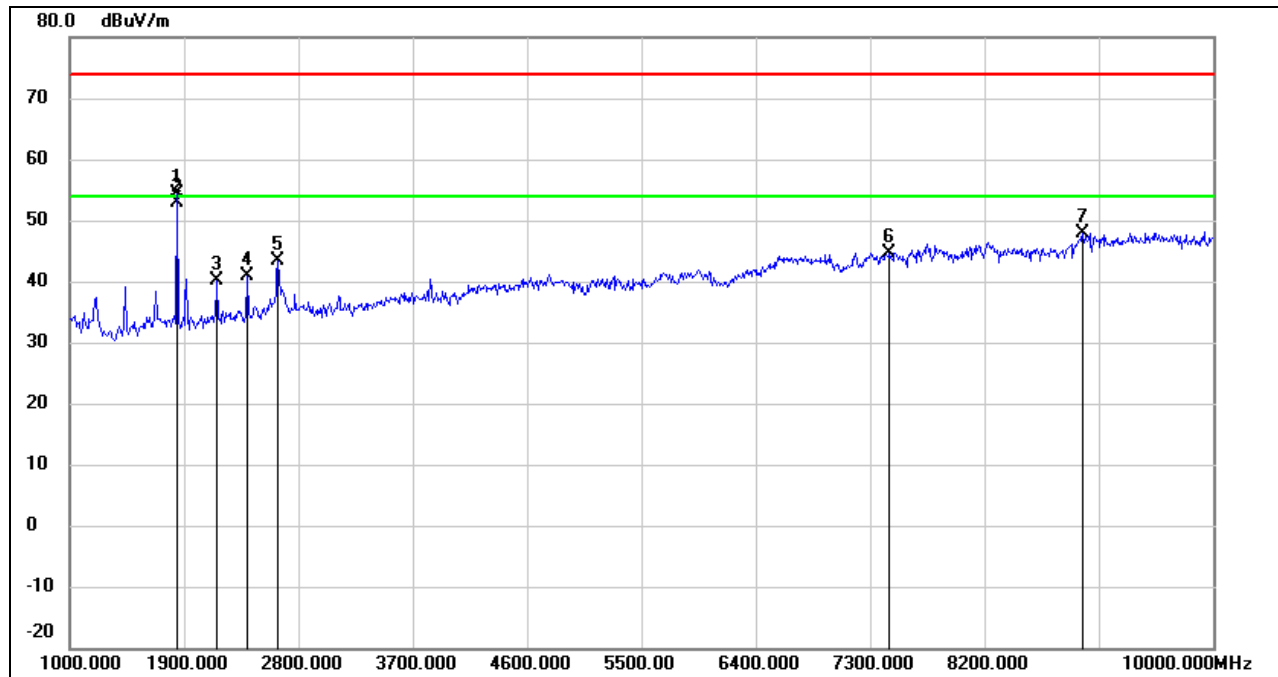
Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

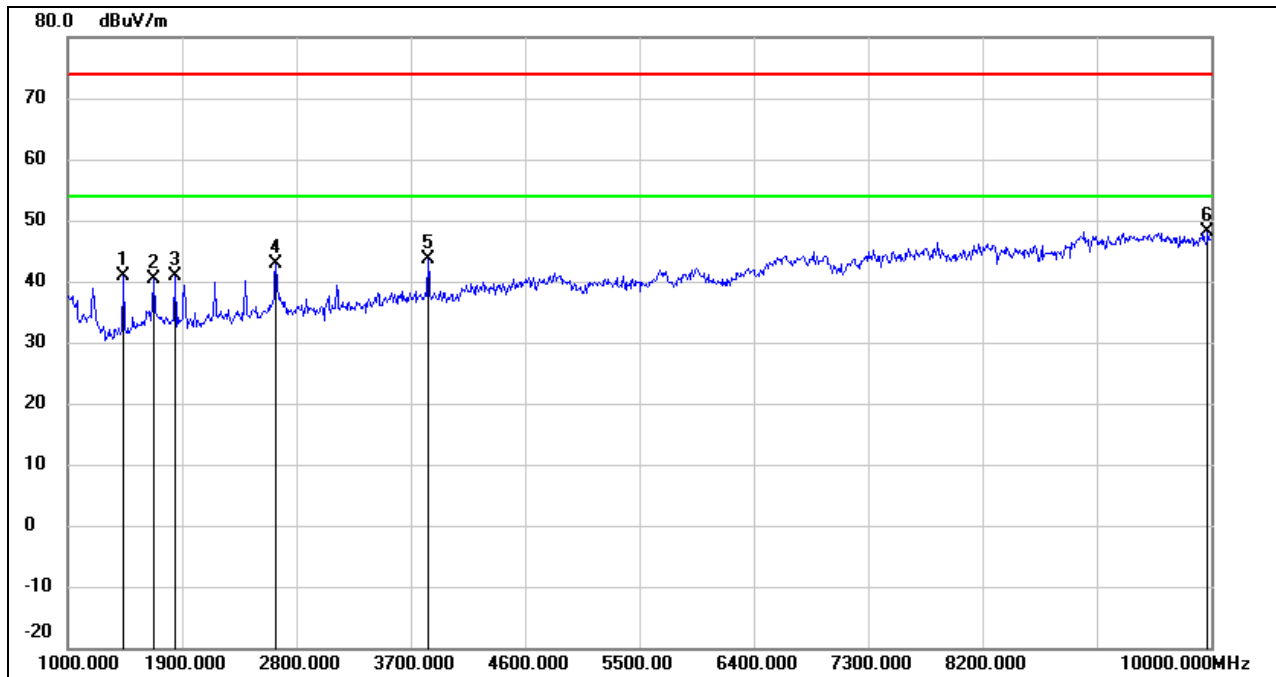
HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1846.000	65.02	-10.67	54.35	74.00	-19.65	peak
2	1846.000	63.47	-10.67	52.80	54.00	-1.20	AVG
3	2161.000	50.01	-9.96	40.05	74.00	-33.95	peak
4	2395.000	49.83	-8.96	40.87	74.00	-33.13	peak
5	2638.000	51.73	-8.39	43.34	74.00	-30.66	peak
6	7453.000	38.99	5.72	44.71	74.00	-29.29	peak
7	8974.000	38.69	9.22	47.91	74.00	-26.09	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. AVG: $VBW=1/Ton$, where: Ton is the transmitting duration.
5. For the transmitting duration, please refer to clause 7.1.
6. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1441.000	53.68	-12.79	40.89	74.00	-33.11	peak
2	1675.000	51.66	-11.37	40.29	74.00	-33.71	peak
3	1846.000	51.59	-10.67	40.92	74.00	-33.08	peak
4	2638.000	51.16	-8.39	42.77	74.00	-31.23	peak
5	3835.000	47.96	-4.39	43.57	74.00	-30.43	peak
6	9973.000	37.67	10.51	48.18	74.00	-25.82	peak

Note: 1. Measurement = Reading Level + Correct Factor.

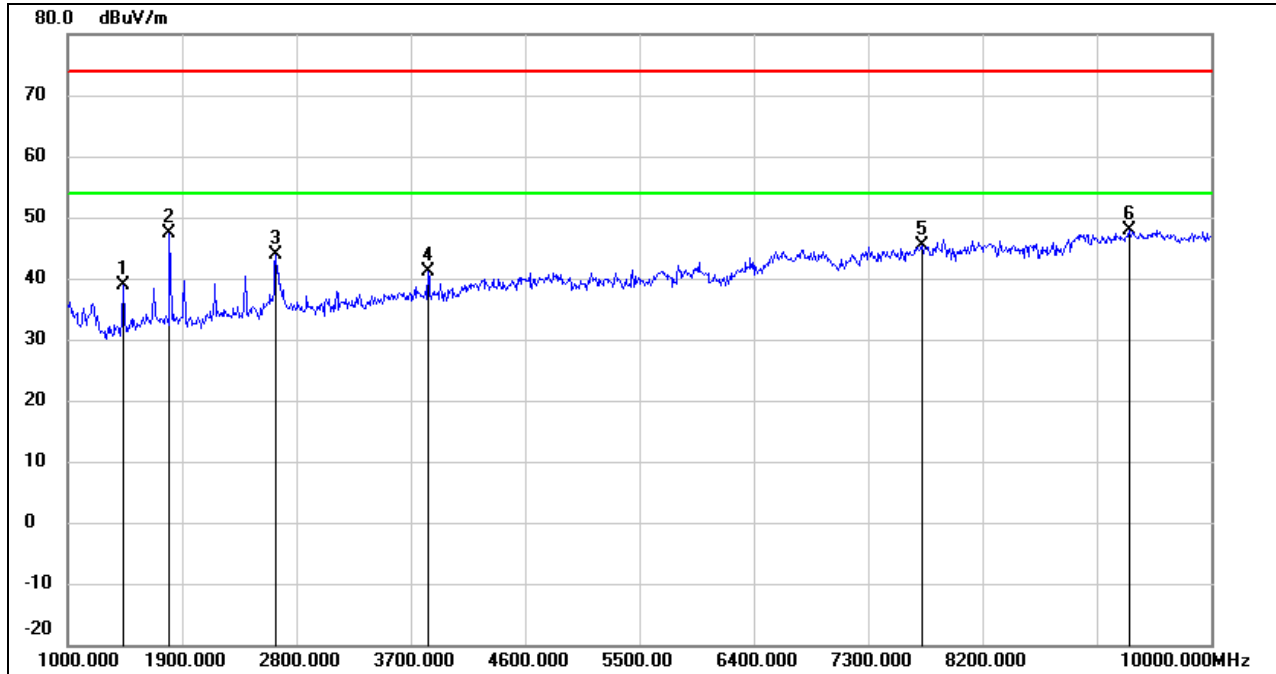
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

8.1.2. 2GFSK - 75 kbps MODE

HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1441.000	51.55	-12.79	38.76	74.00	-35.24	peak
2	1801.000	57.93	-10.58	47.35	74.00	-26.65	peak
3	2638.000	52.15	-8.39	43.76	74.00	-30.24	peak
4	3835.000	45.58	-4.39	41.19	74.00	-32.81	peak
5	7723.000	39.50	5.83	45.33	74.00	-28.67	peak
6	9352.000	38.40	9.37	47.77	74.00	-26.23	peak

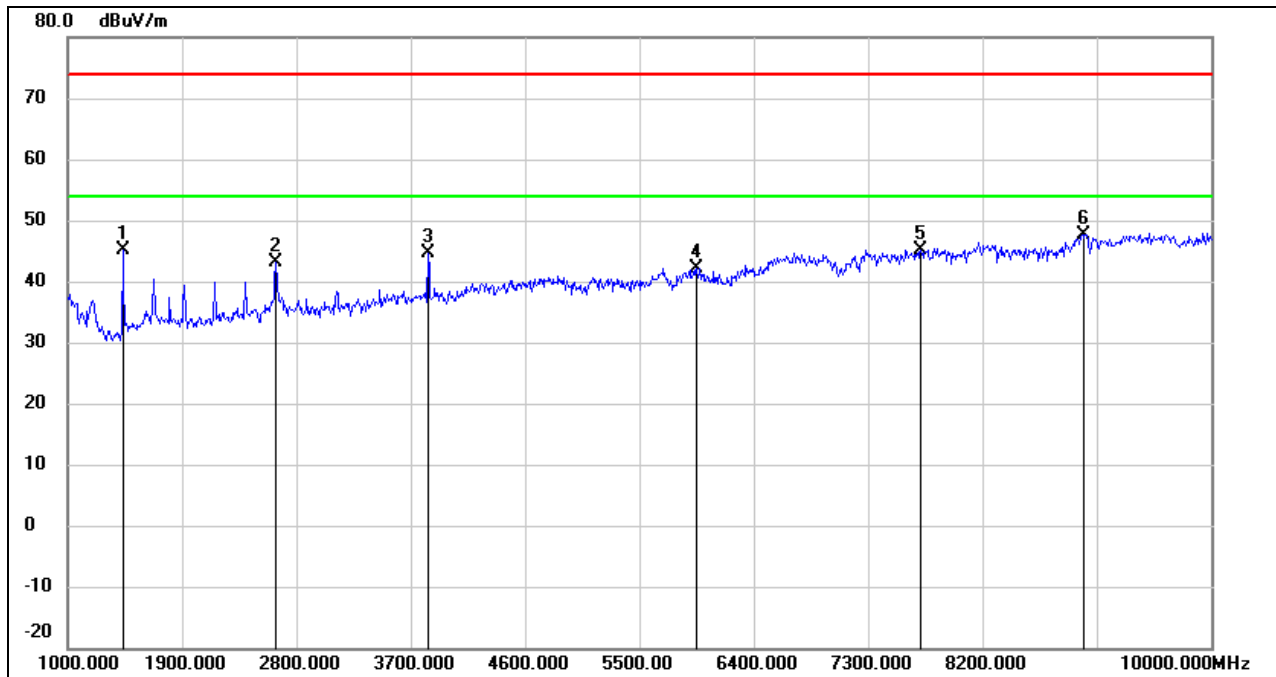
Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

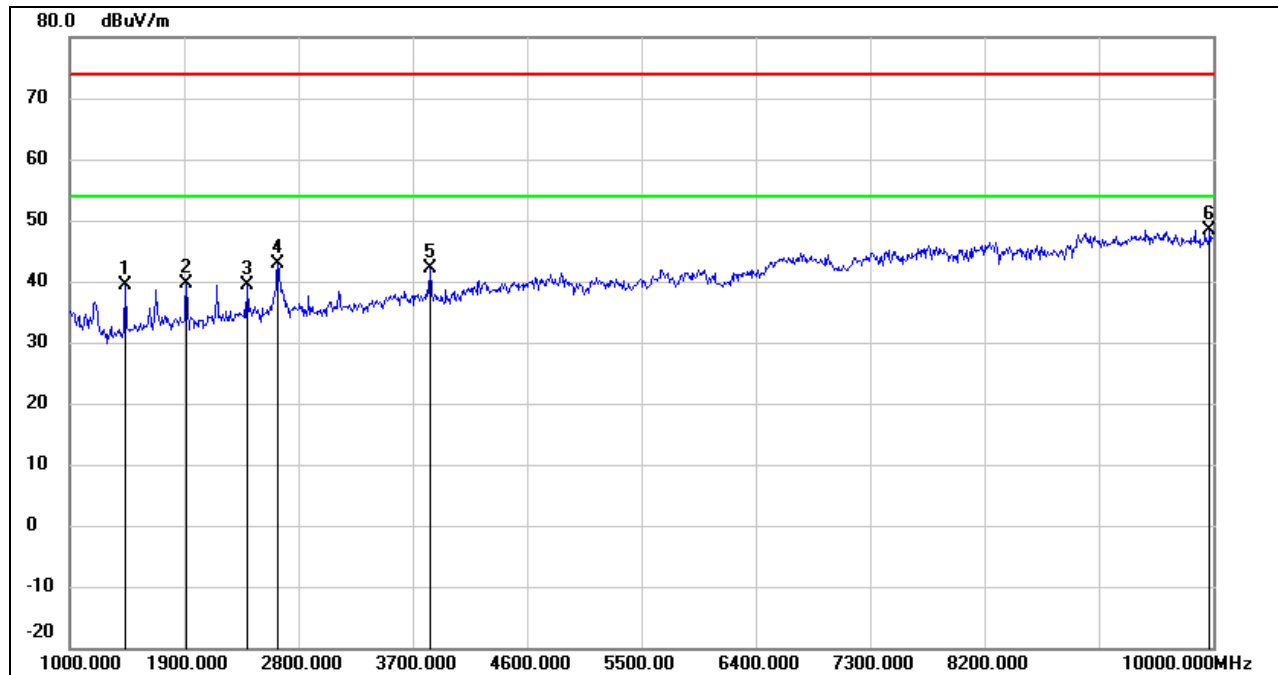
4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1432.000	58.06	-12.85	45.21	74.00	-28.79	peak
2	2638.000	51.49	-8.39	43.10	74.00	-30.90	peak
3	3835.000	49.11	-4.39	44.72	74.00	-29.28	peak
4	5950.000	41.05	1.19	42.24	74.00	-31.76	peak
5	7714.000	39.24	5.81	45.05	74.00	-28.95	peak
6	8992.000	38.12	9.43	47.55	74.00	-26.45	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

**HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, HORIZONTAL)**

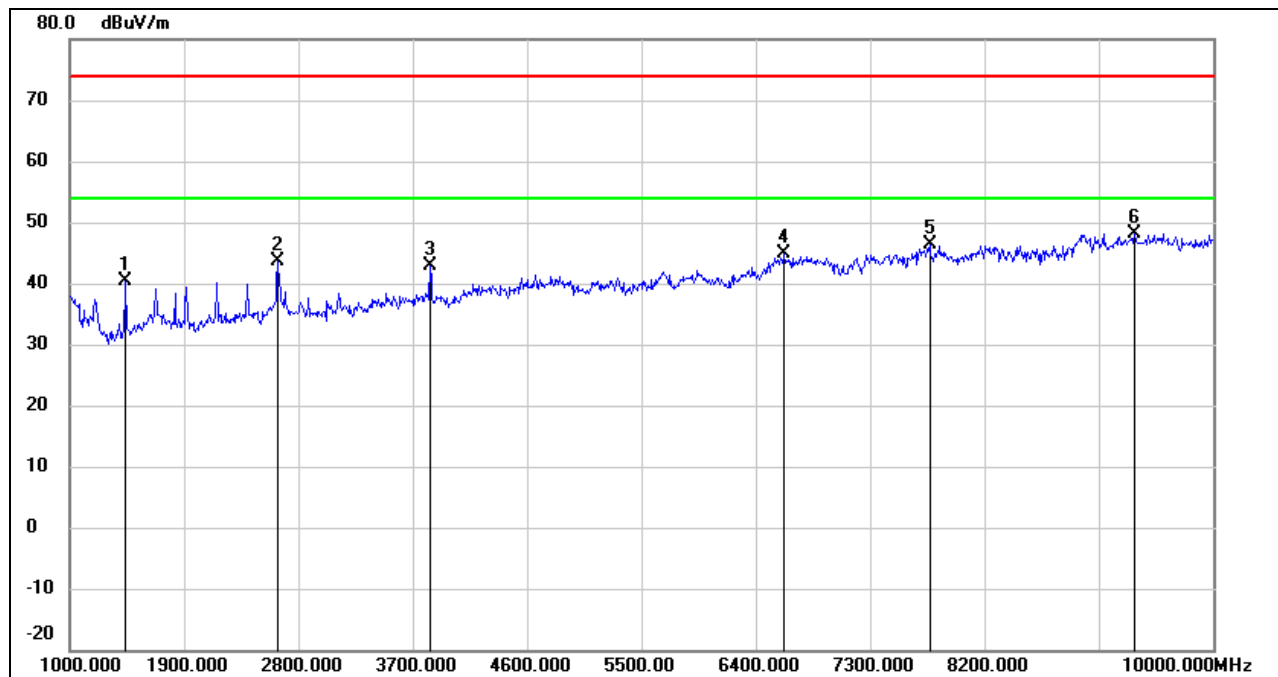
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1441.000	52.27	-12.79	39.48	74.00	-34.52	peak
2	1918.000	50.40	-10.81	39.59	74.00	-34.41	peak
3	2395.000	48.39	-8.96	39.43	74.00	-34.57	peak
4	2638.000	51.29	-8.39	42.90	74.00	-31.10	peak
5	3835.000	46.52	-4.39	42.13	74.00	-31.87	peak
6	9973.000	37.94	10.51	48.45	74.00	-25.55	peak

Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

**HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, VERTICAL)**

No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1441.000	53.14	-12.79	40.35	74.00	-33.65	peak
2	2638.000	52.12	-8.39	43.73	74.00	-30.27	peak
3	3835.000	47.36	-4.39	42.97	74.00	-31.03	peak
4	6625.000	41.22	3.70	44.92	74.00	-29.08	peak
5	7768.000	40.32	5.97	46.29	74.00	-27.71	peak
6	9379.000	38.67	9.55	48.22	74.00	-25.78	peak

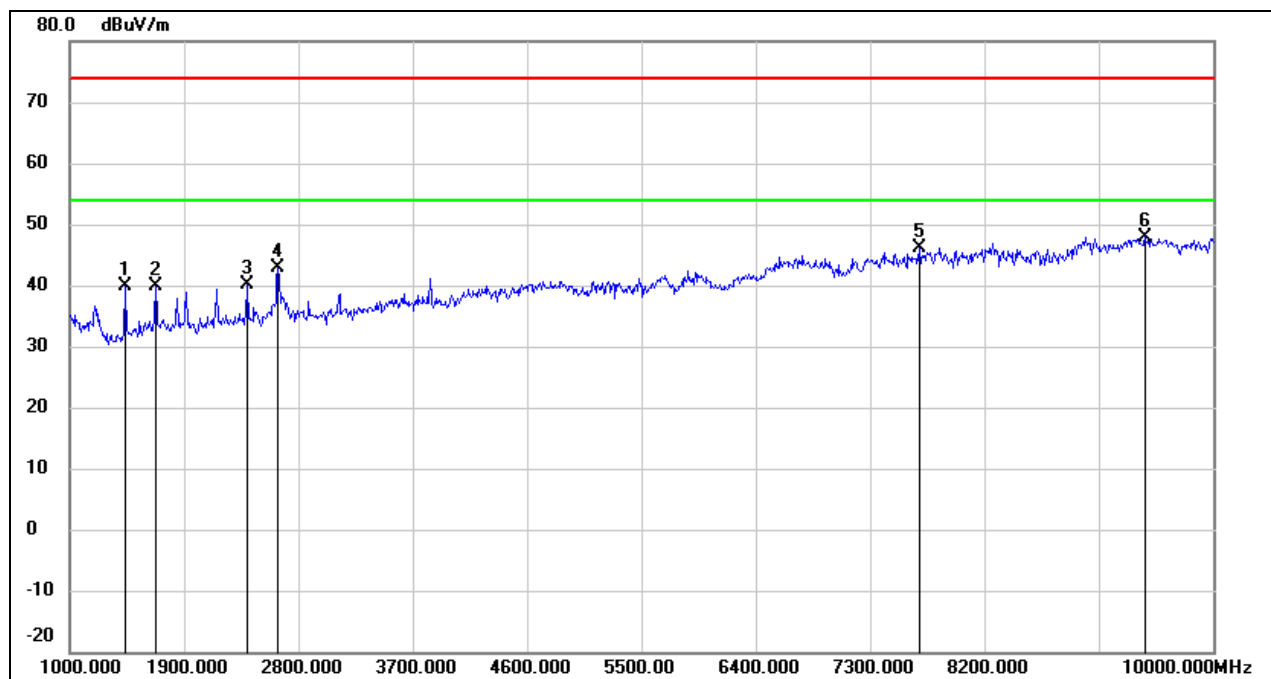
Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

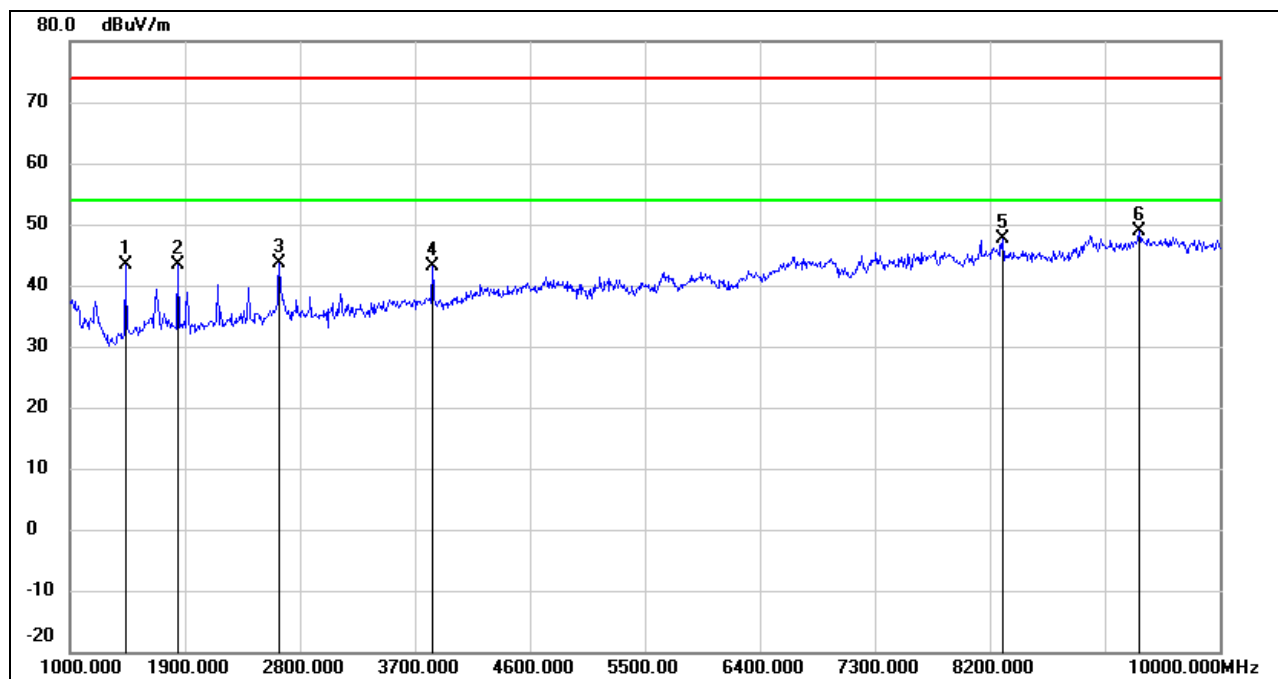
HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1432.000	52.63	-12.85	39.78	74.00	-34.22	peak
2	1675.000	51.35	-11.37	39.98	74.00	-34.02	peak
3	2395.000	49.20	-8.96	40.24	74.00	-33.76	peak
4	2638.000	51.31	-8.39	42.92	74.00	-31.08	peak
5	7687.000	40.53	5.71	46.24	74.00	-27.76	peak
6	9460.000	38.16	9.84	48.00	74.00	-26.00	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1432.000	56.28	-12.85	43.43	74.00	-30.57	peak
2	1846.000	53.98	-10.67	43.31	74.00	-30.69	peak
3	2638.000	51.97	-8.39	43.58	74.00	-30.42	peak
4	3835.000	47.60	-4.39	43.21	74.00	-30.79	peak
5	8299.000	40.68	6.94	47.62	74.00	-26.38	peak
6	9370.000	39.31	9.49	48.80	74.00	-25.20	peak

Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

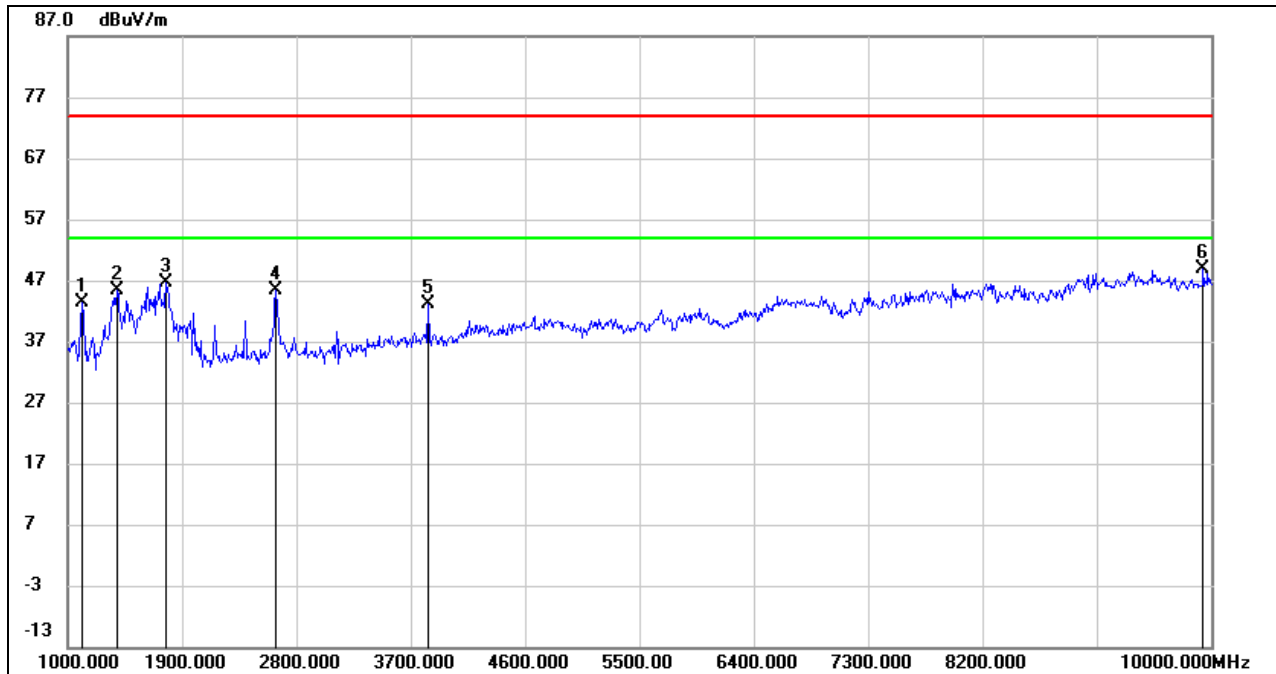
3. Peak: Peak detector.

4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.



8.1.3. 2GFSK - 150 kbps MODE

HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1117.000	57.70	-14.27	43.43	74.00	-30.57	peak
2	1391.500	58.52	-13.09	45.43	74.00	-28.57	peak
3	1778.500	57.25	-10.71	46.54	74.00	-27.46	peak
4	2638.000	53.71	-8.39	45.32	74.00	-28.68	peak
5	3839.500	47.64	-4.40	43.24	74.00	-30.76	peak
6	9937.000	38.39	10.41	48.80	74.00	-25.20	peak

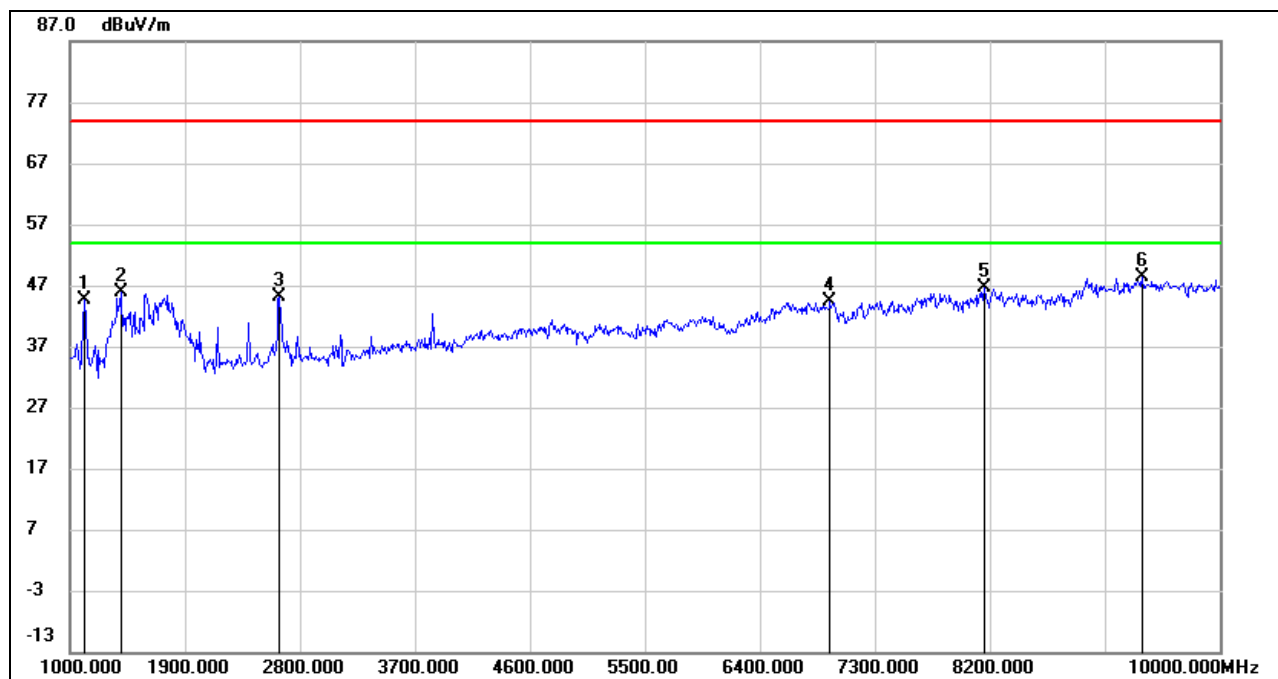
Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1121.500	58.81	-14.24	44.57	74.00	-29.43	peak
2	1396.000	58.84	-13.07	45.77	74.00	-28.23	peak
3	2638.000	53.46	-8.39	45.07	74.00	-28.93	peak
4	6949.000	40.24	4.18	44.42	74.00	-29.58	peak
5	8155.000	39.75	6.81	46.56	74.00	-27.44	peak
6	9388.000	38.86	9.61	48.47	74.00	-25.53	peak

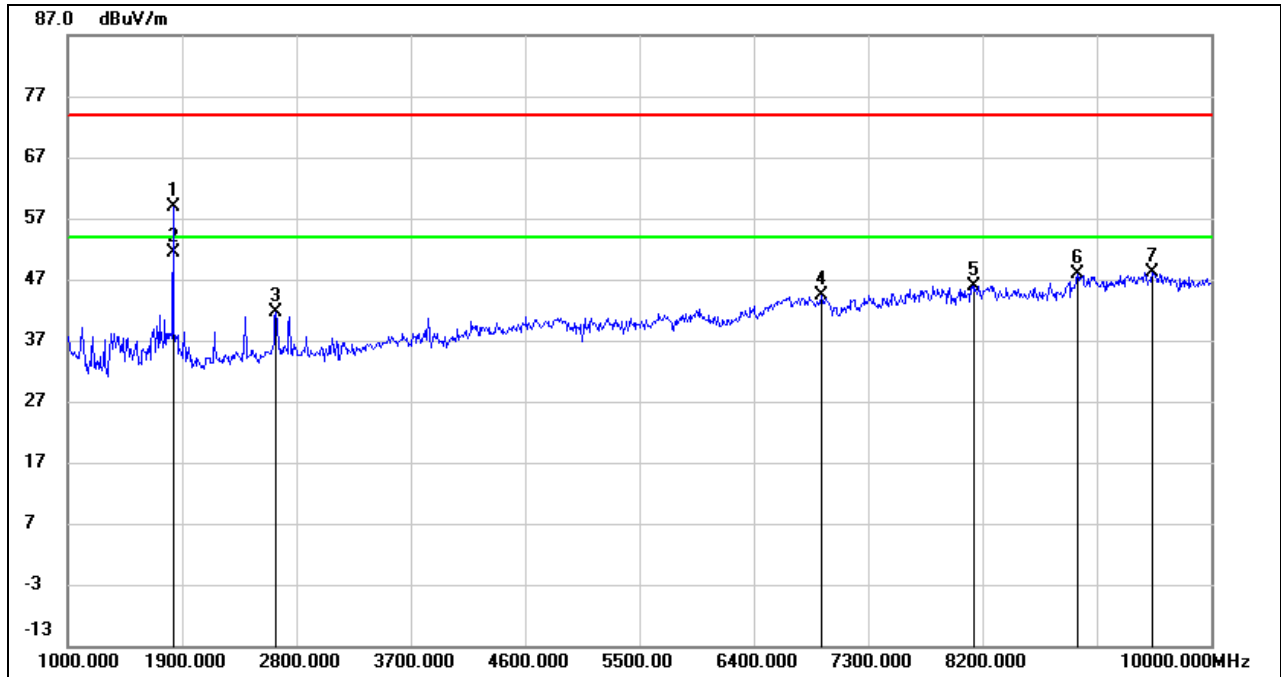
Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

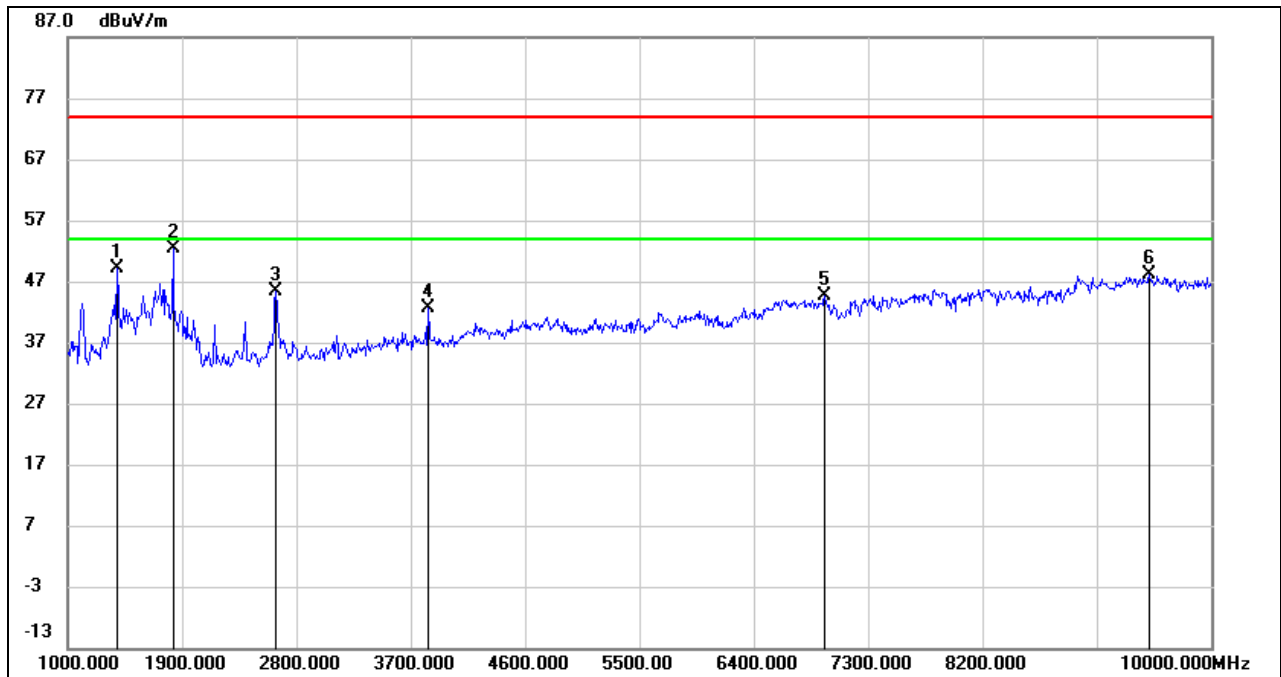
HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1828.000	69.56	-10.63	58.93	74.00	-15.07	peak
2	1828.000	61.92	-10.63	51.29	54.00	-2.71	AVG
3	2638.000	49.99	-8.39	41.60	74.00	-32.40	peak
4	6931.000	40.16	4.13	44.29	74.00	-29.71	peak
5	8137.000	39.34	6.64	45.98	74.00	-28.02	peak
6	8951.500	39.04	8.95	47.99	74.00	-26.01	peak
7	9536.500	38.23	10.01	48.24	74.00	-25.76	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. AVG: $VBW=1/T_{on}$, where: T_{on} is the transmitting duration.
5. For the transmitting duration, please refer to clause 7.1.
6. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, VERTICAL)



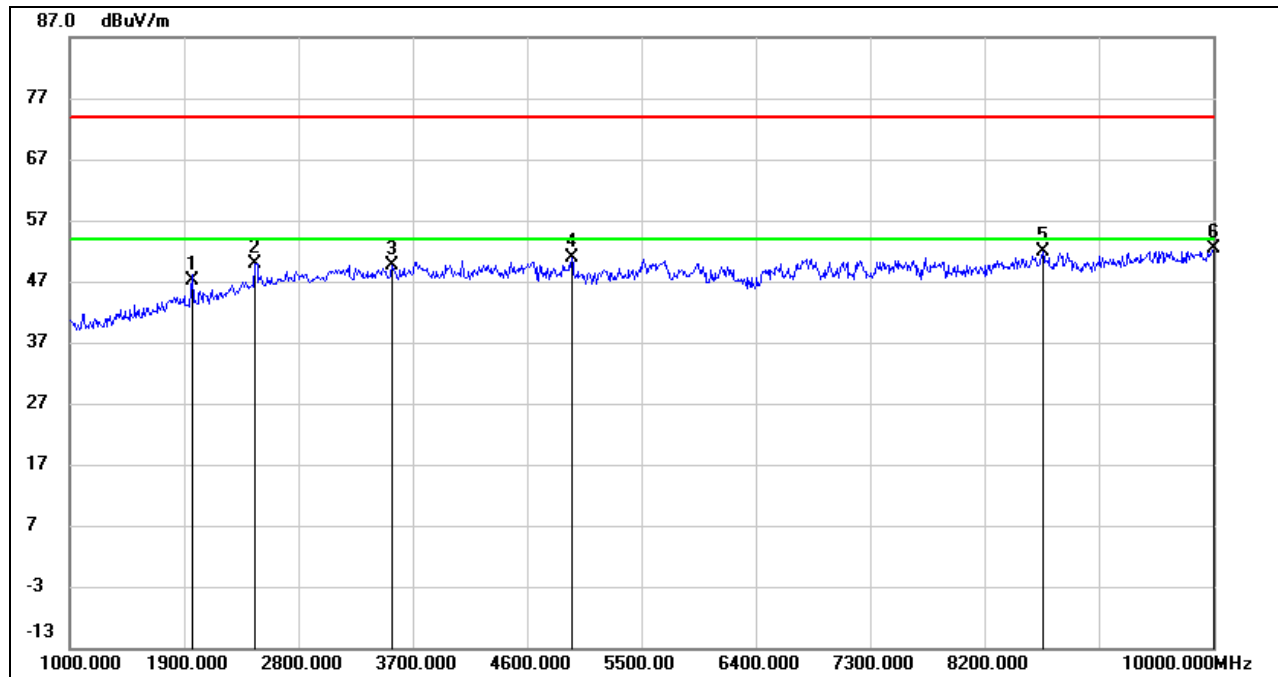
Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1963.000	16.33	30.79	47.12	74.00	-26.88	peak
2	2462.500	16.92	33.00	49.92	74.00	-24.08	peak
3	3542.500	14.29	35.25	49.54	74.00	-24.46	peak
4	4951.000	11.75	39.25	51.00	74.00	-23.00	peak
5	8663.500	6.32	45.47	51.79	74.00	-22.21	peak
6	10000.000	4.57	47.74	52.31	74.00	-21.69	peak

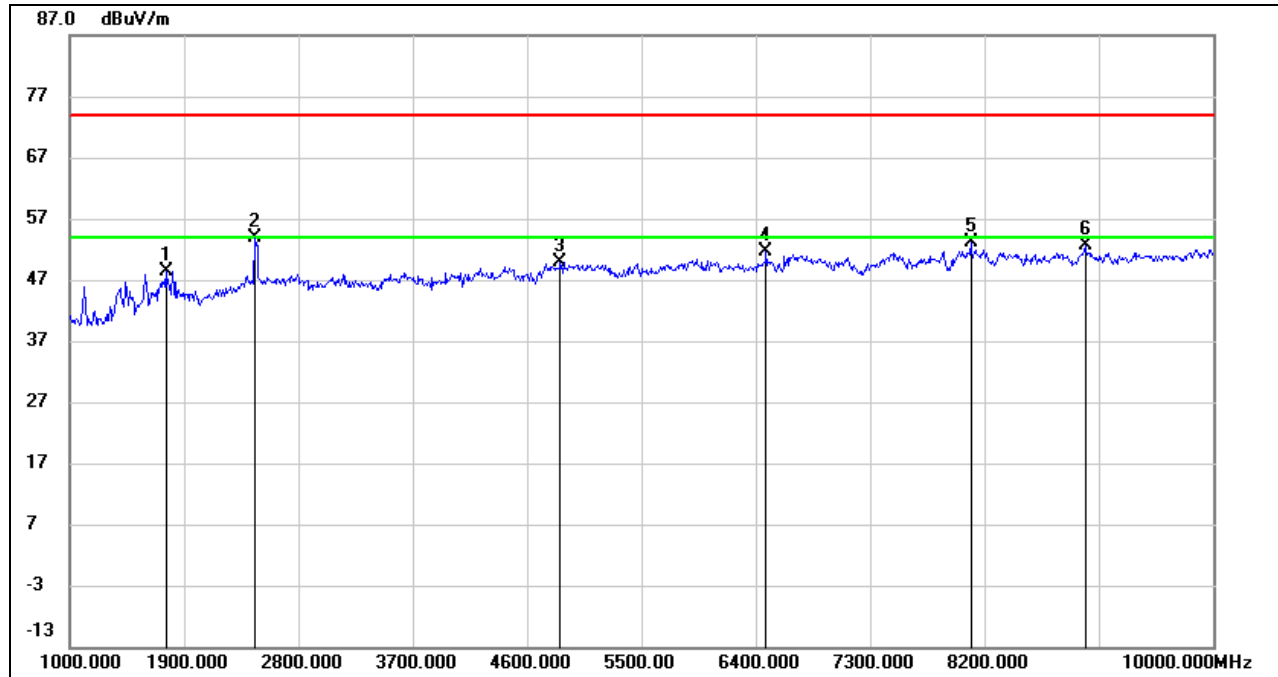
Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, VERTICAL)

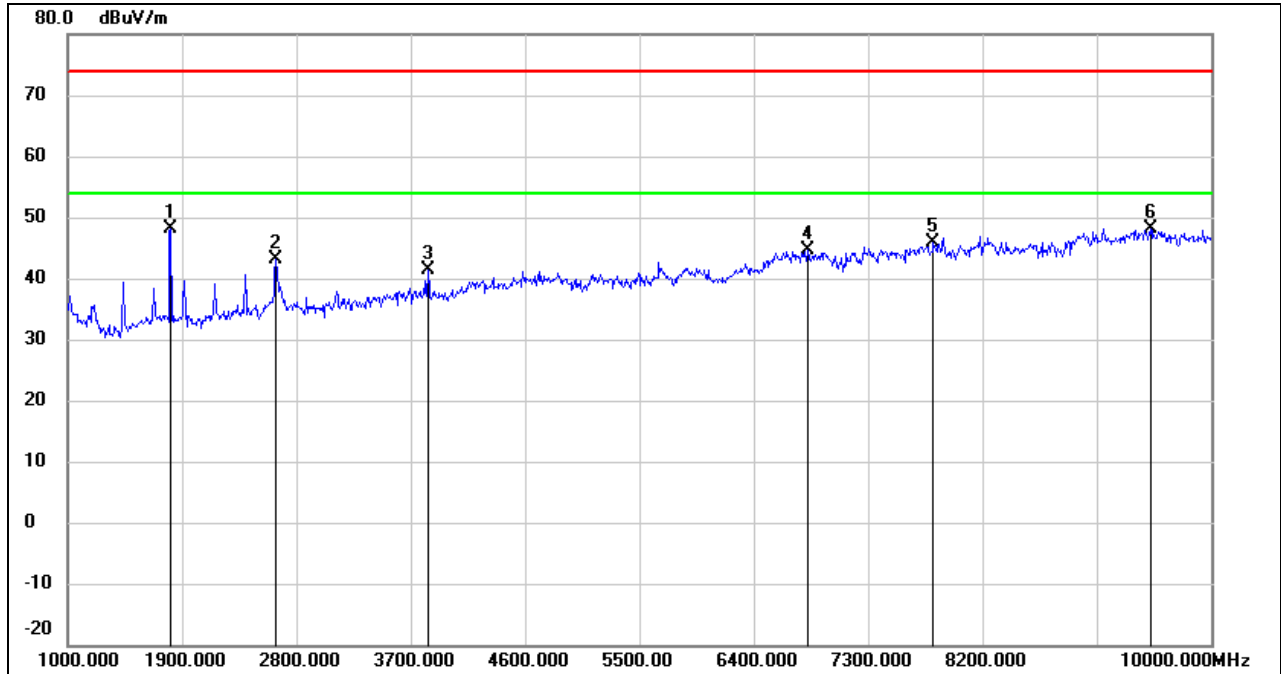


No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1756.000	18.21	30.26	48.47	74.00	-25.53	peak
2	2462.500	20.84	33.00	53.84	74.00	-20.16	peak
3	4865.500	10.90	38.98	49.88	74.00	-24.12	peak
4	6481.000	7.94	43.62	51.56	74.00	-22.44	peak
5	8096.500	6.62	46.52	53.14	74.00	-20.86	peak
6	8996.500	4.87	47.76	52.63	74.00	-21.37	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

8.1.4. 2GFSK - 250 kbps MODE

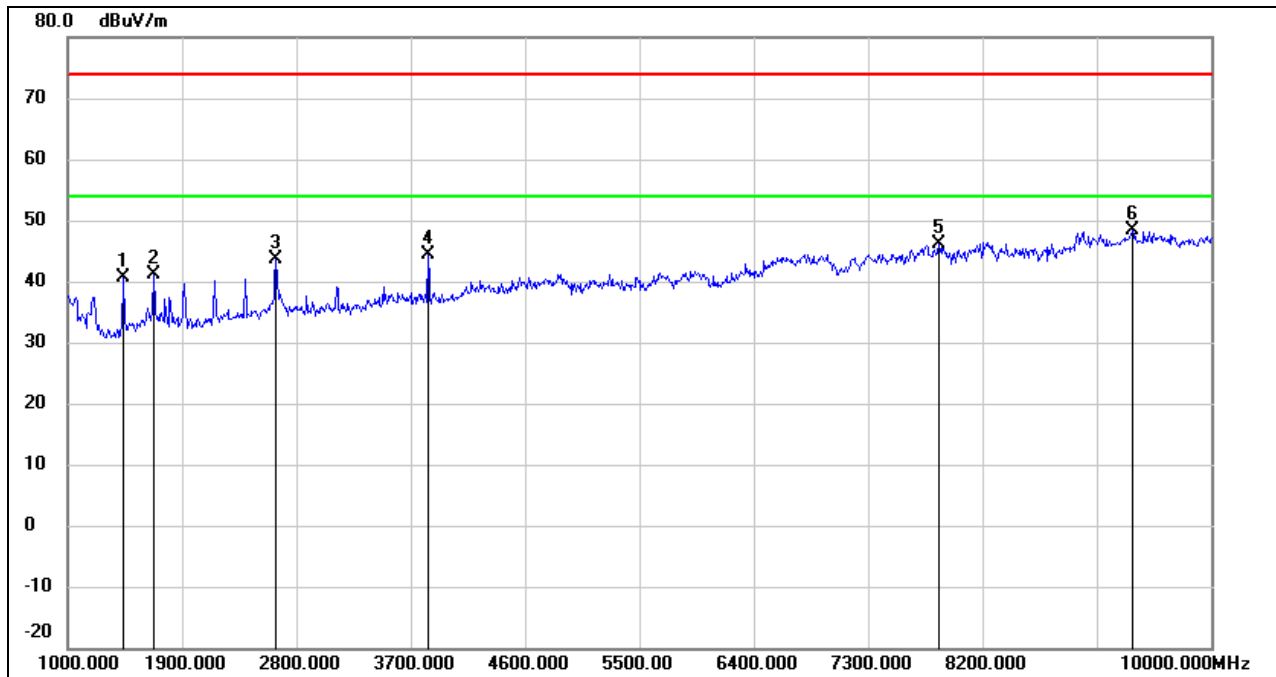
HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1810.000	58.65	-10.60	48.05	74.00	-25.95	peak
2	2638.000	51.61	-8.39	43.22	74.00	-30.78	peak
3	3835.000	45.70	-4.39	41.31	74.00	-32.69	peak
4	6823.000	40.75	3.82	44.57	74.00	-29.43	peak
5	7813.000	39.76	6.04	45.80	74.00	-28.20	peak
6	9523.000	38.20	9.97	48.17	74.00	-25.83	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1441.000	53.44	-12.79	40.65	74.00	-33.35	peak
2	1675.000	52.44	-11.37	41.07	74.00	-32.93	peak
3	2638.000	52.05	-8.39	43.66	74.00	-30.34	peak
4	3835.000	48.80	-4.39	44.41	74.00	-29.59	peak
5	7858.000	40.25	5.86	46.11	74.00	-27.89	peak
6	9379.000	38.90	9.55	48.45	74.00	-25.55	peak

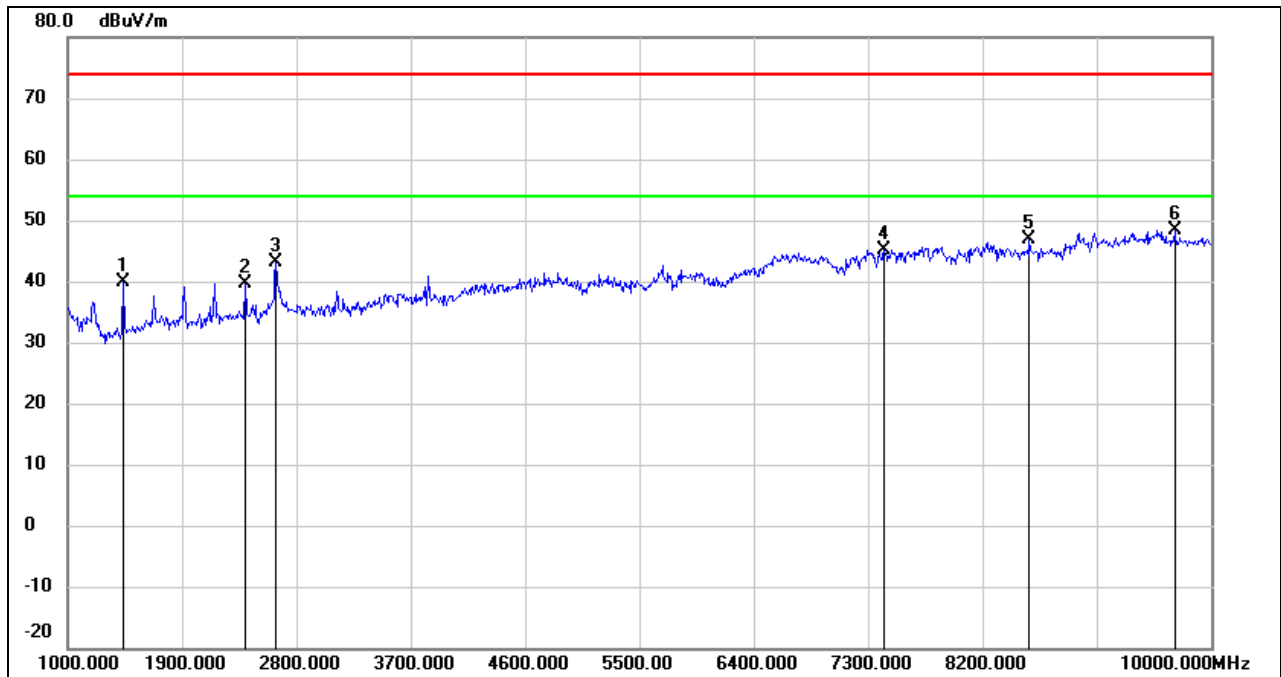
Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1432.000	52.76	-12.85	39.91	74.00	-34.09	peak
2	2395.000	48.56	-8.96	39.60	74.00	-34.40	peak
3	2638.000	51.61	-8.39	43.22	74.00	-30.78	peak
4	7426.000	39.32	5.77	45.09	74.00	-28.91	peak
5	8569.000	40.04	6.80	46.84	74.00	-27.16	peak
6	9712.000	38.24	10.04	48.28	74.00	-25.72	peak

Note: 1. Measurement = Reading Level + Correct Factor.

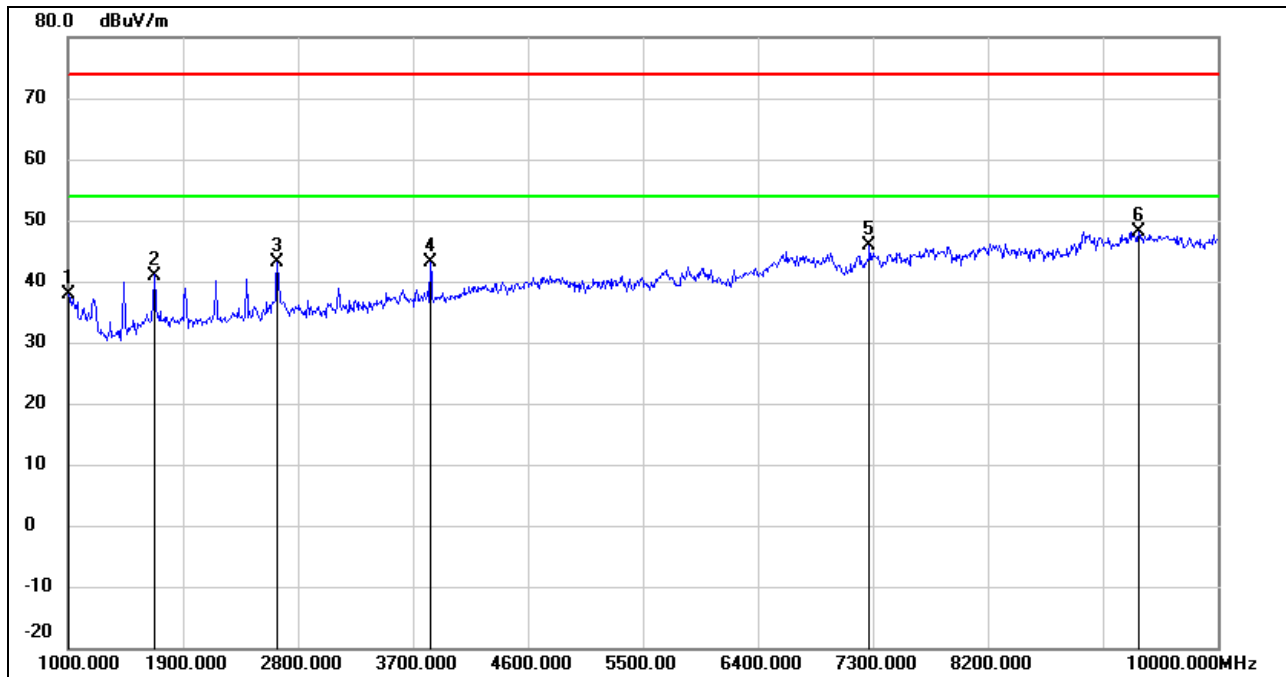
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

5.*-indicates frequency is out of the restricted bands and the limit is referring to 15.247 (d) and RSS-247 clause 5.5. We had already performed the conducted non-restricted bands test, please refer to clause 7.5.

HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1009.000	52.92	-15.00	37.92	74.00	-36.08	peak
2	1675.000	52.37	-11.37	41.00	74.00	-33.00	peak
3	2638.000	51.59	-8.39	43.20	74.00	-30.80	peak
4	3835.000	47.59	-4.39	43.20	74.00	-30.80	peak
5	7273.000	40.41	5.36	45.77	74.00	-28.23	peak
6	9379.000	38.67	9.55	48.22	74.00	-25.78	peak

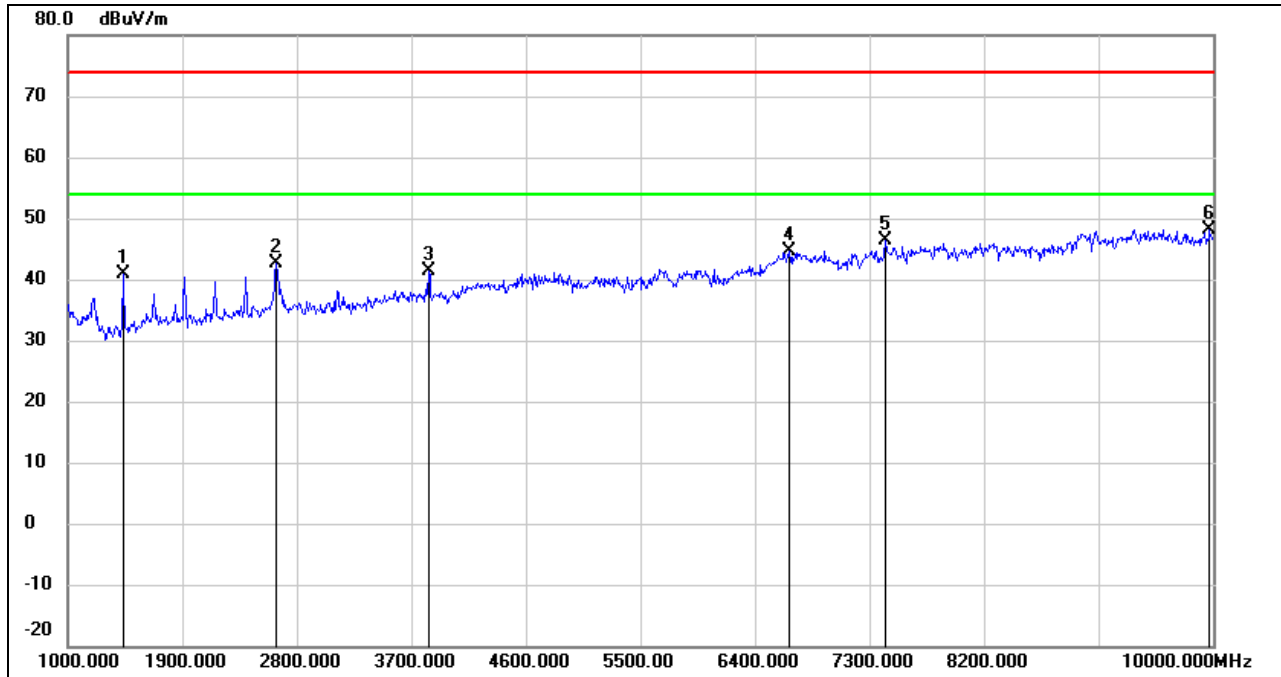
Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1432.000	53.65	-12.85	40.80	74.00	-33.20	peak
2	2638.000	50.92	-8.39	42.53	74.00	-31.47	peak
3	3835.000	45.65	-4.39	41.26	74.00	-32.74	peak
4	6670.000	40.84	3.71	44.55	74.00	-29.45	peak
5	7426.000	40.51	5.77	46.28	74.00	-27.72	peak
6	9973.000	37.64	10.51	48.15	74.00	-25.85	peak

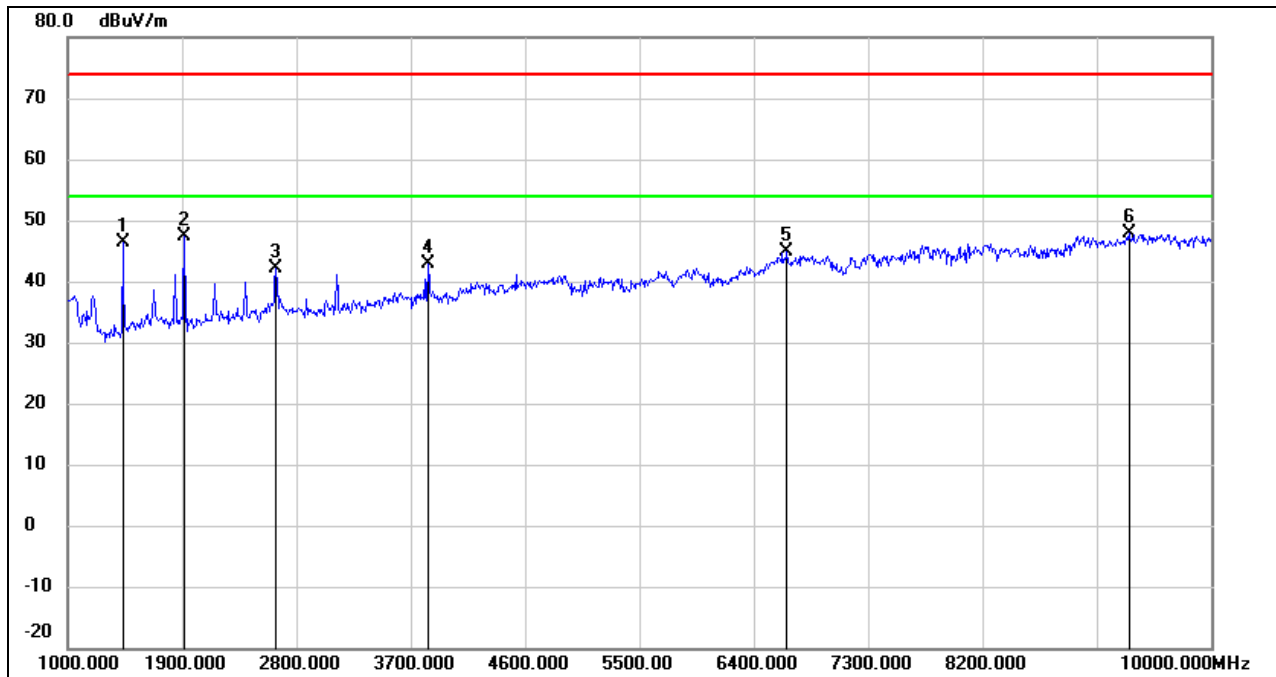
Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1432.000	59.14	-12.85	46.29	74.00	-27.71	peak
2	1918.000	58.07	-10.81	47.26	74.00	-26.74	peak
3	2638.000	50.53	-8.39	42.14	74.00	-31.86	peak
4	3835.000	47.28	-4.39	42.89	74.00	-31.11	peak
5	6661.000	41.11	3.71	44.82	74.00	-29.18	peak
6	9352.000	38.44	9.37	47.81	74.00	-26.19	peak

Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

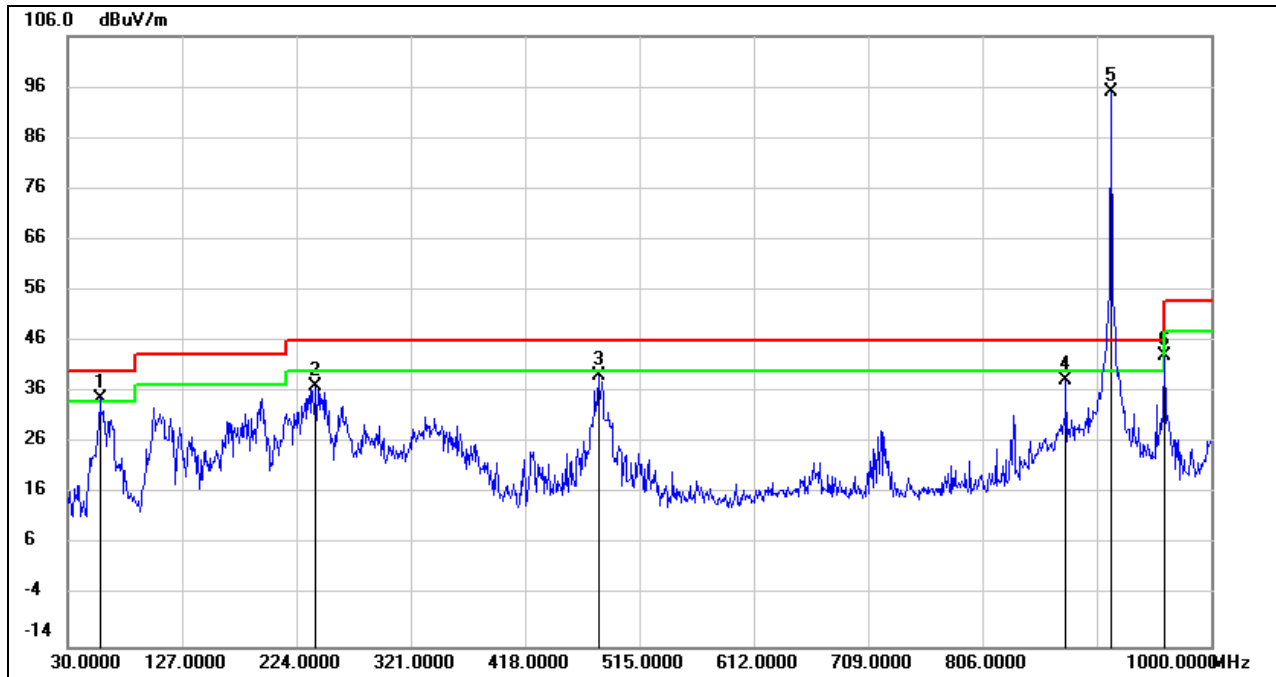
3. Peak: Peak detector.

4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

8.2. SPURIOUS EMISSIONS (30 MHz ~ 1 GHz)

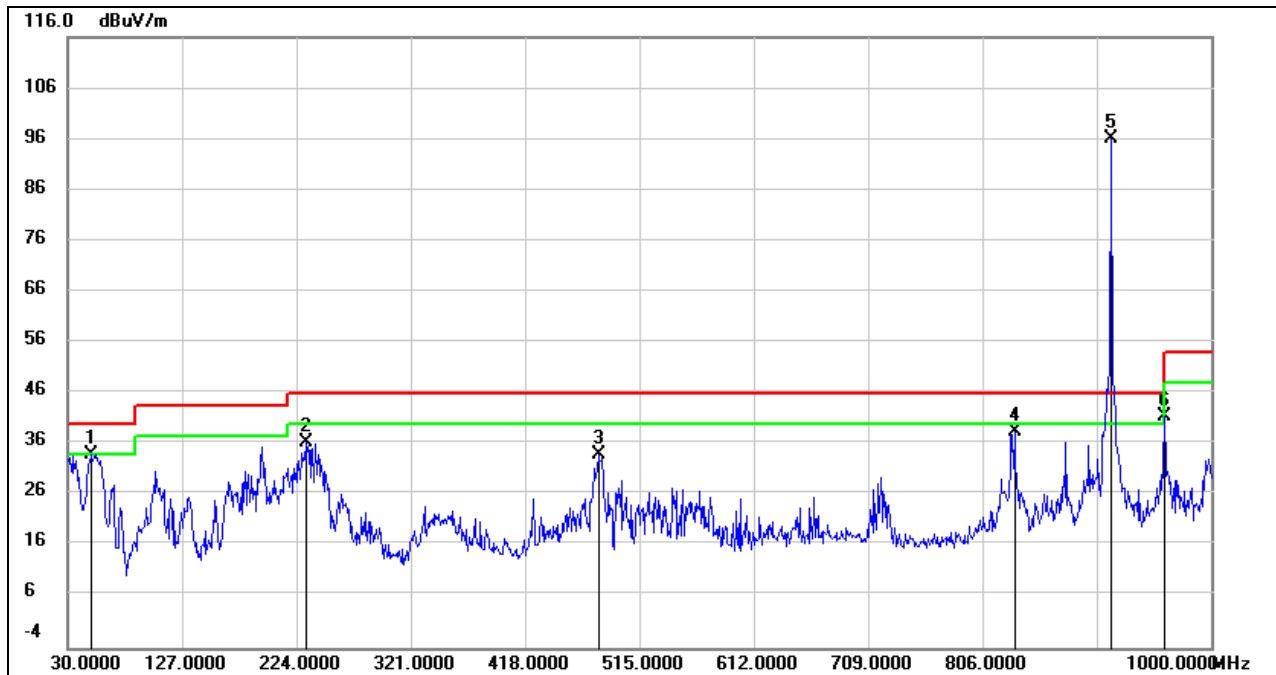
8.2.1. 2GFSK - 250 kbps MODE

SPURIOUS EMISSIONS (MID CHANNEL, WORST-CASE CONFIGURATION, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	57.1600	55.21	-20.58	34.63	40.00	-5.37	QP
2	240.4900	56.21	-19.17	37.04	46.00	-8.96	QP
3	480.0800	50.91	-11.79	39.12	46.00	-6.88	QP
4	876.8100	43.92	-5.60	38.32	46.00	-7.68	QP
5	914.6400	99.93	-4.88	95.05	/	/	Fundamental
6	960.2300	47.62	-4.54	43.08	54.00	-10.92	QP

- Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

**SPURIOUS EMISSIONS (HIGH CHANNEL, WORST-CASE CONFIGURATION, VERTICAL)**

No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	50.3700	54.80	-20.76	34.04	40.00	-5.96	QP
2	231.7600	55.15	-18.76	36.39	46.00	-9.61	QP
3	480.0800	45.80	-11.79	34.01	46.00	-11.99	QP
4	833.1599	45.04	-6.61	38.43	46.00	-7.57	QP
5	914.6400	101.07	-4.88	96.19	/	/	Fundamental
6	960.2300	46.10	-4.54	41.56	54.00	-12.44	QP

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.

2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.

3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto

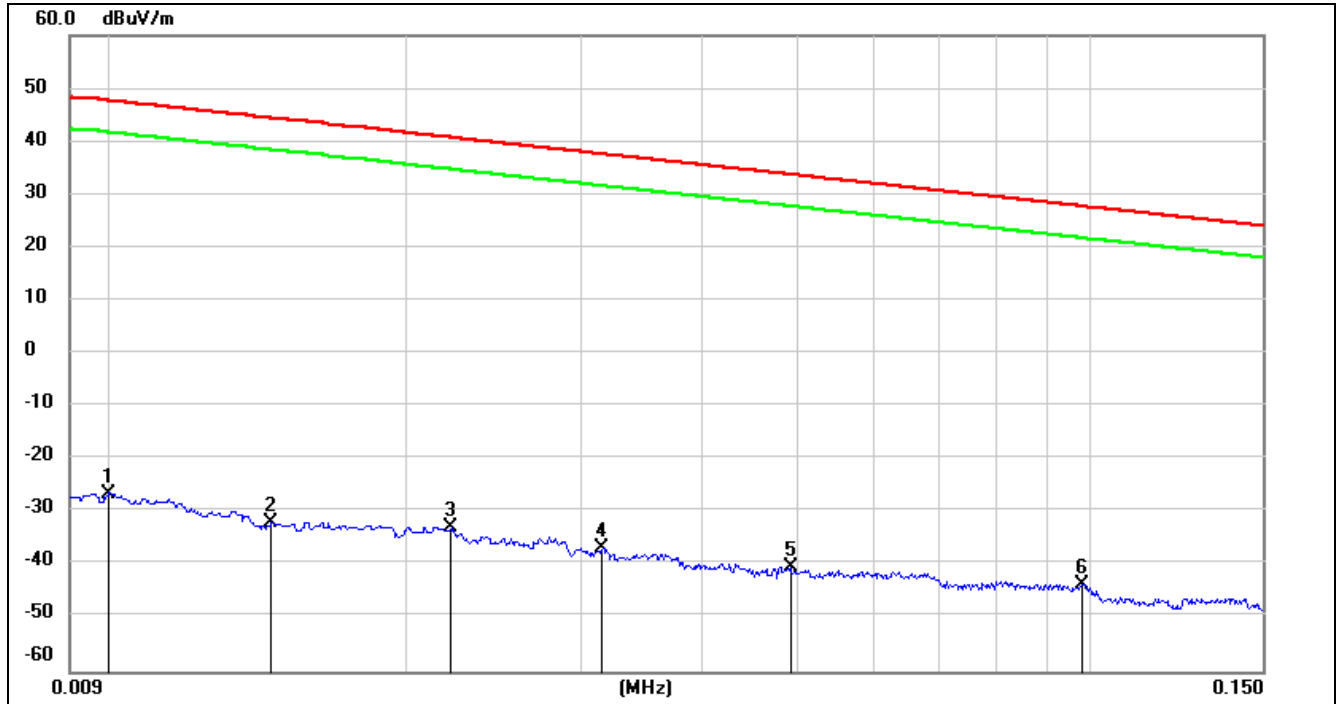
Note: All the modes and channels have been tested, only the worst data was recorded in the report.

8.3. SPURIOUS EMISSIONS BELOW 30 MHz

8.3.1. 2GFSK - 250 kbps MODE

SPURIOUS EMISSIONS (LOW CHANNEL, LOOP ANTENNA FACE ON TO THE EUT, WORST-CASE CONFIGURATION)

9 kHz~ 150 kHz

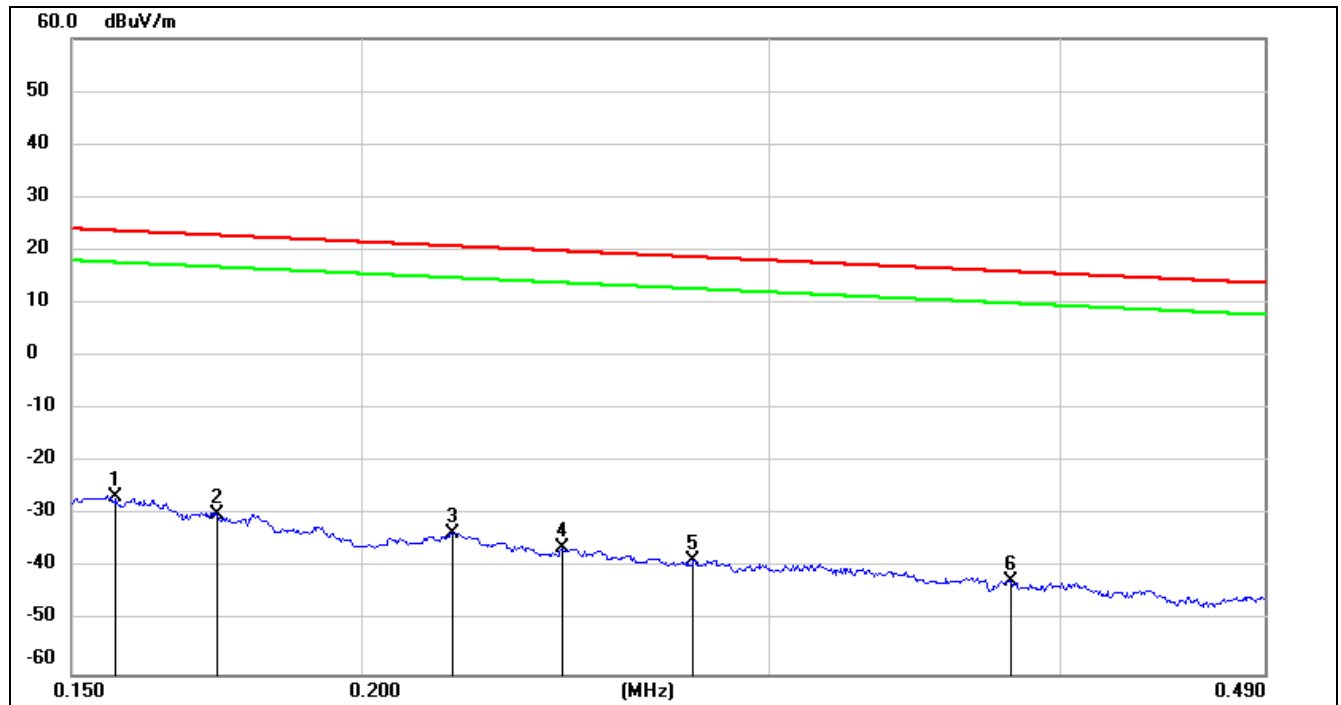


No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	FCC Result (dBuV/m)	FCC Limit (dBuV/m)	ISED Result (dBuA/m)	ISED Limit (dBuA/m)	Margin (dB)	Remark
1	0.0100	74.72	-101.40	-26.68	47.6	-78.18	-3.90	-74.28	peak
2	0.0145	69.55	-101.38	-31.83	44.37	-83.33	-7.13	-76.20	peak
3	0.0221	68.63	-101.35	-32.72	40.71	-84.22	-10.79	-73.43	peak
4	0.0316	64.74	-101.40	-36.66	37.61	-88.16	-13.89	-74.27	peak
5	0.0492	61.05	-101.47	-40.42	33.76	-91.92	-17.74	-74.18	peak
6	0.0981	58.27	-101.78	-43.51	27.77	-95.01	-23.73	-71.28	peak

Note: 1. Measurement = Reading Level + Correct Factor (dBuA/m= dBuV/m- 20Log10[120π] = dBuV/m- 51.5).

2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.

3. All 3 polarizations (Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report.

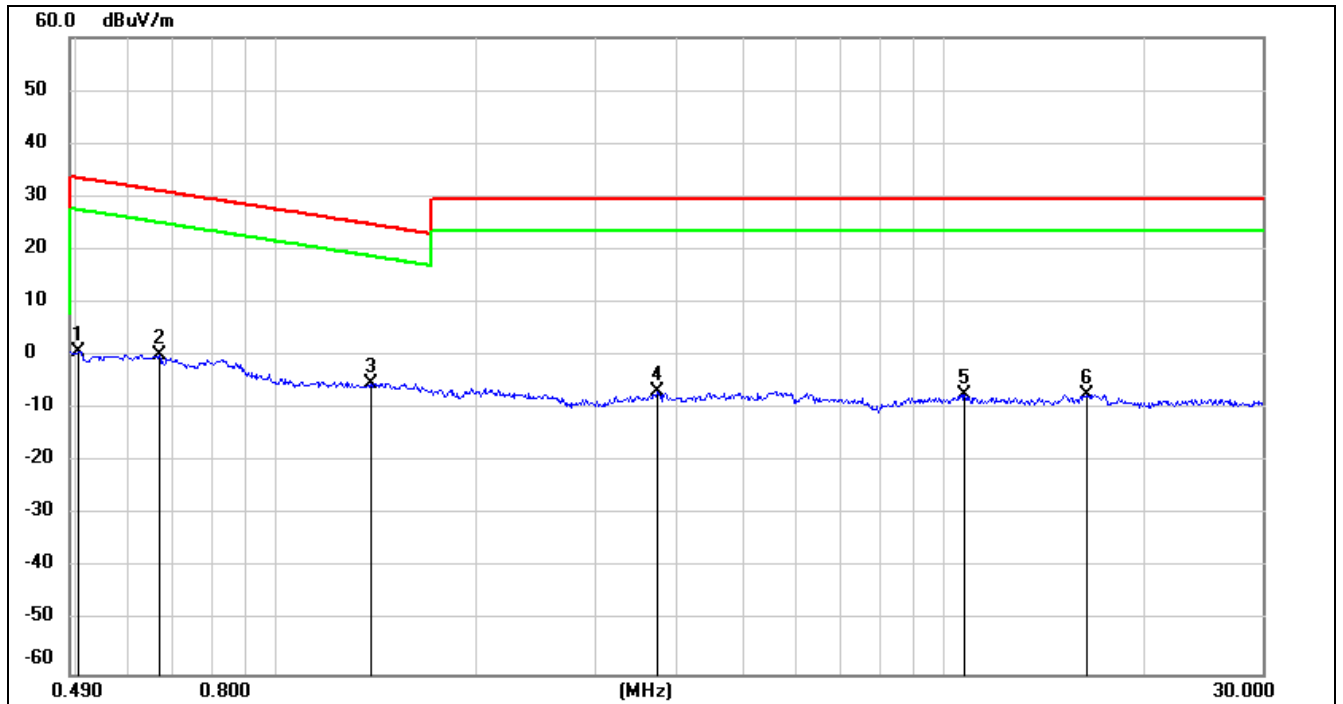
150 kHz ~ 490 kHz

No.	Frequency	Reading	Correct	FCC Result	FCC Limit	ISED Result	ISED Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dBuA/m)	(dBuA/m)	(dB)	
1	0.1567	74.95	-101.65	-26.7	23.7	-78.20	-27.80	-50.40	peak
2	0.1733	71.92	-101.67	-29.75	22.83	-81.25	-28.67	-52.58	peak
3	0.2190	68.27	-101.75	-33.48	20.79	-84.98	-30.71	-54.27	peak
4	0.2442	65.53	-101.79	-36.26	19.85	-87.76	-31.65	-56.11	peak
5	0.2782	63.29	-101.83	-38.54	18.71	-90.04	-32.79	-57.25	peak
6	0.3809	59.41	-101.94	-42.53	15.99	-94.03	-35.51	-58.52	peak

Note: 1. Measurement = Reading Level + Correct Factor (dBuA/m= dBuV/m- 20Log10[120 π] = dBuV/m- 51.5).

2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.

3. All 3 polarizations (Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report.

490 kHz ~ 30 MHz

No.	Frequency	Reading	Correct	FCC Result	FCC Limit	ISED Result	ISED Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dBuA/m)	(dBuA/m)	(dB)	
1	0.5039	62.93	-62.07	0.86	33.56	-50.64	-17.94	-32.70	peak
2	0.6671	62.25	-62.10	0.15	31.12	-51.35	-20.38	-30.97	peak
3	1.3810	56.97	-62.10	-5.13	24.8	-56.63	-26.70	-29.93	peak
4	3.7100	54.70	-61.41	-6.71	29.54	-58.21	-21.96	-36.25	peak
5	10.7299	53.48	-60.83	-7.35	29.54	-58.85	-21.96	-36.89	peak
6	16.3959	53.67	-60.96	-7.29	29.54	-58.79	-21.96	-36.83	peak

Note: 1. Measurement = Reading Level + Correct Factor (dBuA/m= dBuV/m- 20Log10[120 π] = dBuV/m- 51.5).

2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.

3. All 3 polarizations (Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report.

Note: All the modes and channels have been tested, only the worst data was recorded in the report.

9. AC POWER LINE CONDUCTED EMISSIONS

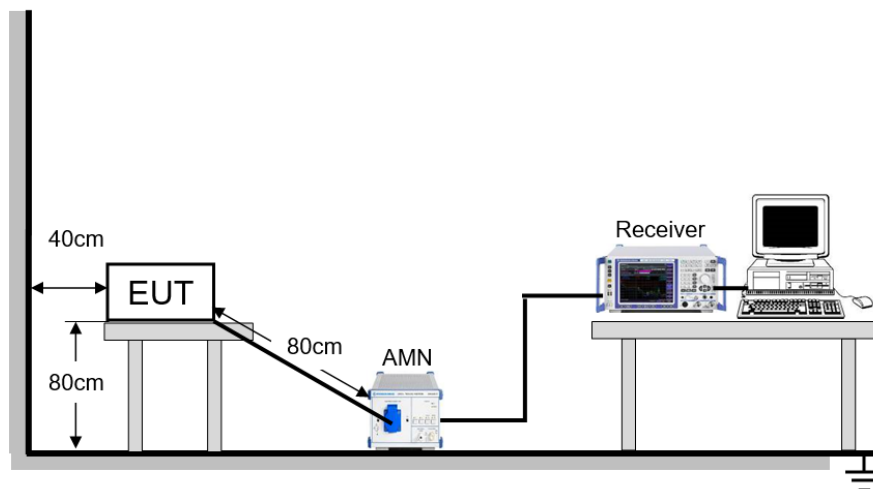
LIMITS

Please refer to CFR 47 FCC §15.207 (a).

FREQUENCY (MHz)	Quasi-peak	Average
0.15 -0.5	66 - 56 *	56 - 46 *
0.50 -5.0	56.00	46.00
5.0 -30.0	60.00	50.00

TEST SETUP AND PROCEDURE

Refer to ANSI C63.10-2013 clause 6.2.

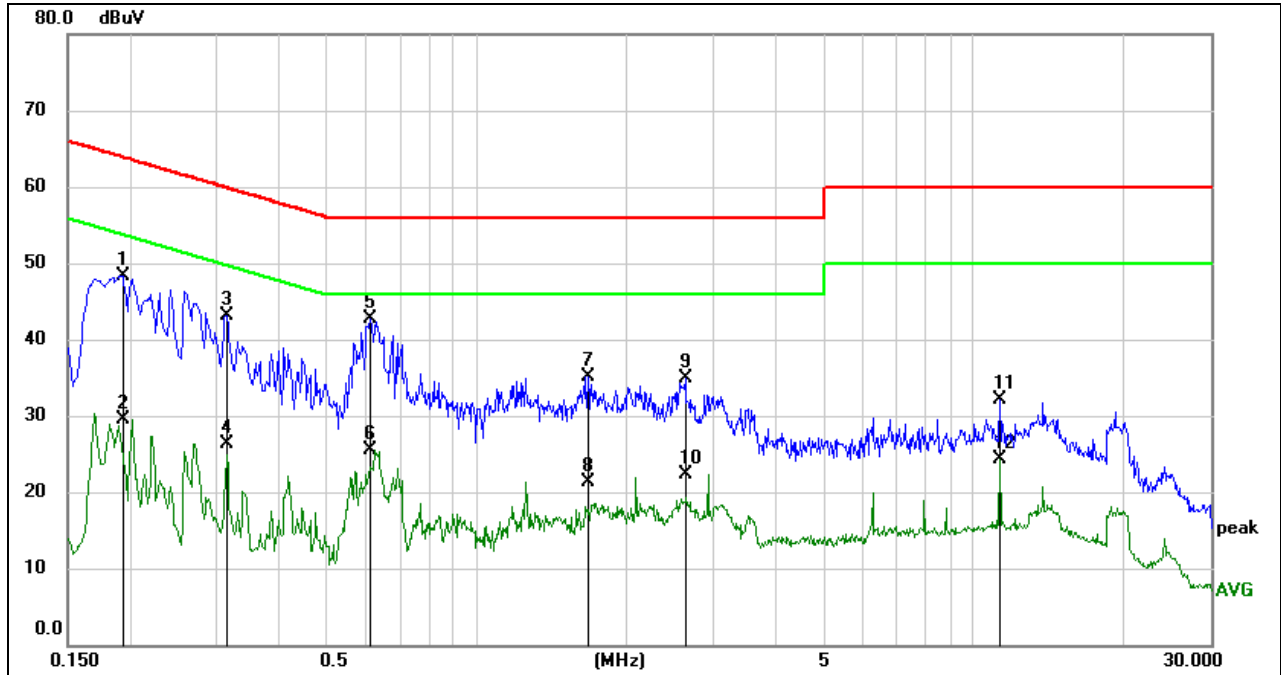


The EUT is put on a table of non-conducting material that is 80 cm high. The vertical conducting wall of shielding is located 40 cm to the rear of the EUT. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.). A EMI Measurement Receiver (R&S Test Receiver ESR3) is used to test the emissions from both sides of AC line. According to the requirements in Section 6.2 of ANSI C63.10-2013. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode. The bandwidth of EMI test receiver is set at 9 kHz.

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application.

TEST ENVIRONMENT

Temperature	23.5 °C	Relative Humidity	61.2 %
Atmosphere Pressure	101 kPa	Test Voltage	AC 120 V/60 Hz

**RESULTS****9.1.1. 2GFSK - 250 kbps MODE****LINE L RESULTS (LOW CHANNEL, WORST-CASE CONFIGURATION)**

No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1940	38.78	9.58	48.36	63.86	-15.50	QP
2	0.1940	19.98	9.58	29.56	53.86	-24.30	AVG
3	0.3140	33.59	9.55	43.14	59.86	-16.72	QP
4	0.3140	16.80	9.55	26.35	49.86	-23.51	AVG
5	0.6100	33.15	9.50	42.65	56.00	-13.35	QP
6	0.6100	16.09	9.50	25.59	46.00	-20.41	AVG
7	1.6738	25.50	9.59	35.09	56.00	-20.91	QP
8	1.6738	11.75	9.59	21.34	46.00	-24.66	AVG
9	2.6300	25.35	9.62	34.97	56.00	-21.03	QP
10	2.6300	12.68	9.62	22.30	46.00	-23.70	AVG
11	11.2979	22.40	9.64	32.04	60.00	-27.96	QP
12	11.2979	14.70	9.64	24.34	50.00	-25.66	AVG

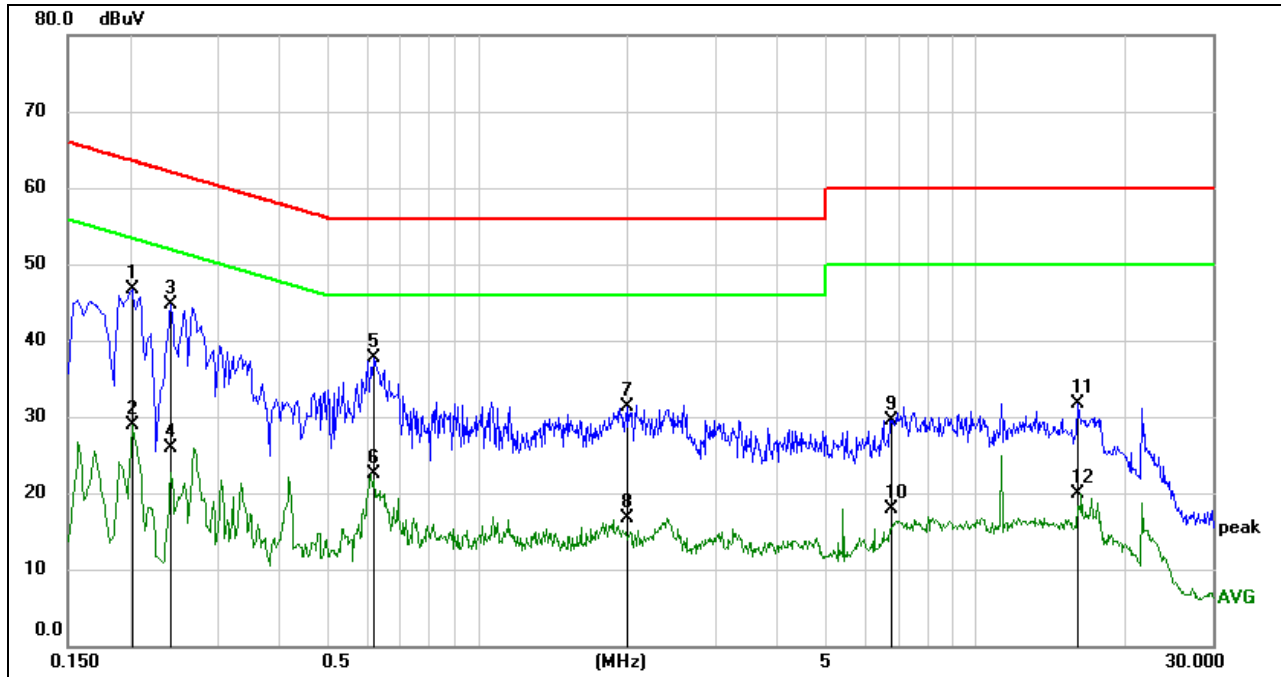
Note: 1. Result = Reading +Correct Factor.

2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Test setup: RBW: 200 Hz (9 kHz ~ 150 kHz), 9 kHz (150 kHz ~ 30 MHz).

4. Step size: 80 Hz (0.009 MHz ~ 0.15 MHz), 4 kHz (0.15 MHz ~ 30 MHz), Scan time: auto.

LINE N RESULTS (LOW CHANNEL, WORST-CASE CONFIGURATION)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.2017	37.12	9.59	46.71	63.54	-16.83	QP
2	0.2017	19.31	9.59	28.90	53.54	-24.64	AVG
3	0.2416	35.09	9.55	44.64	62.04	-17.40	QP
4	0.2416	16.26	9.55	25.81	52.04	-26.23	AVG
5	0.6173	28.29	9.48	37.77	56.00	-18.23	QP
6	0.6173	13.11	9.48	22.59	46.00	-23.41	AVG
7	2.0011	21.70	9.63	31.33	56.00	-24.67	QP
8	2.0011	7.03	9.63	16.66	46.00	-29.34	AVG
9	6.7333	19.93	9.63	29.56	60.00	-30.44	QP
10	6.7333	8.20	9.63	17.83	50.00	-32.17	AVG
11	16.0545	22.07	9.73	31.80	60.00	-28.20	QP
12	16.0545	10.18	9.73	19.91	50.00	-30.09	AVG

Note: 1. Result = Reading +Correct Factor.

2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Test setup: RBW: 200 Hz (9 kHz ~ 150 kHz), 9 kHz (150 kHz ~ 30 MHz).

4. Step size: 80 Hz (0.009 MHz ~ 0.15 MHz), 4 kHz (0.15 MHz ~ 30 MHz), Scan time: auto.

Note: All the modes had been tested, but only the worst data was recorded in the report.

10. ANTENNA REQUIREMENTS

APPLICABLE REQUIREMENTS

Please refer to FCC §15.203

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Please refer to FCC §15.247(b)(4)

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

RESULTS

Complies



APPENDIX A: DUTY CYCLE

Test Result

Test Mode	On Time (msec)	Period (msec)	Duty Cycle x (Linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/T Minimum VBW (kHz)	Final setting For VBW (kHz)
2GFSK-25 kbps	17.348	45.681	0.3798	37.98%	4.20	0.0576	1
2GFSK-75 kbps	5.826	18.507	0.3148	31.48%	5.02	0.1716	1
2GFSK-150 kbps	2.957	18.261	0.1619	16.19%	7.91	0.3382	1
2GFSK-250 kbps	1.725	22.014	0.0784	7.84%	11.06	0.5797	1

Note:

Duty Cycle Correction Factor=10log (1/x).

Where: x is Duty Cycle (Linear)

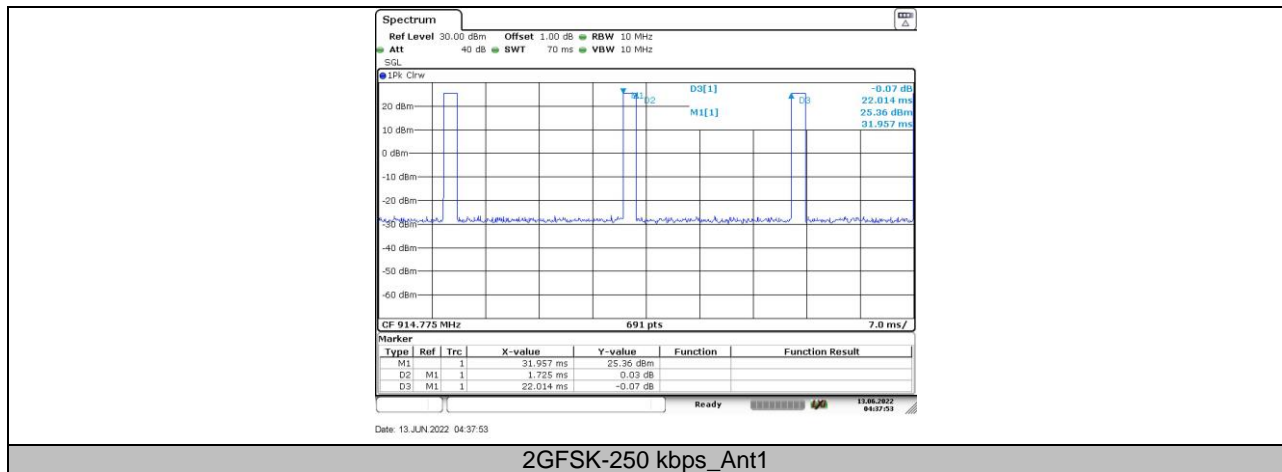
Where: T is On Time

If that calculated VBW is not available on the analyzer then the next higher value should be used.



Test Graphs



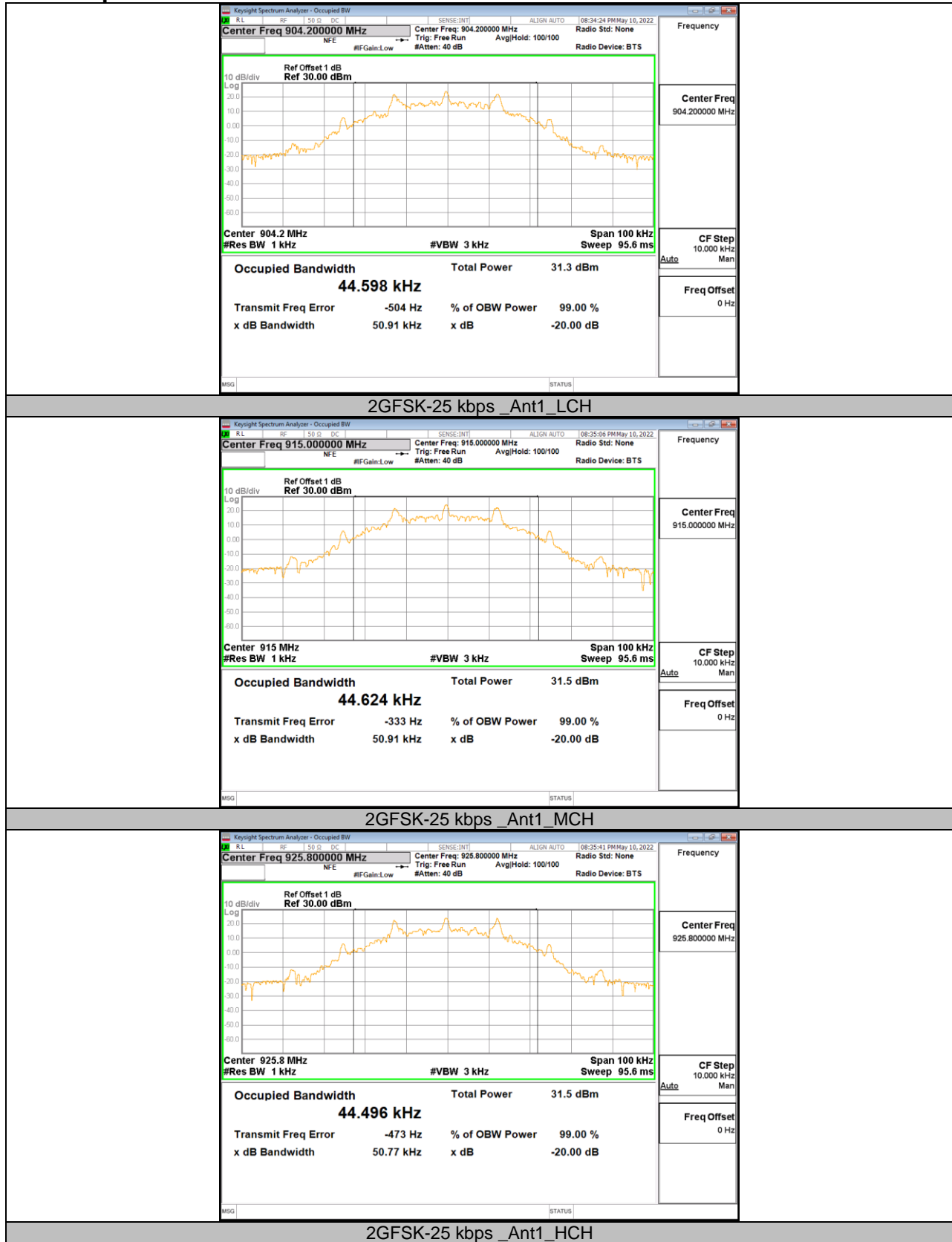


**APPENDIX B: 20DB BANDWIDTH & OCCUPIED CHANNEL BANDWIDTH****Test Result**

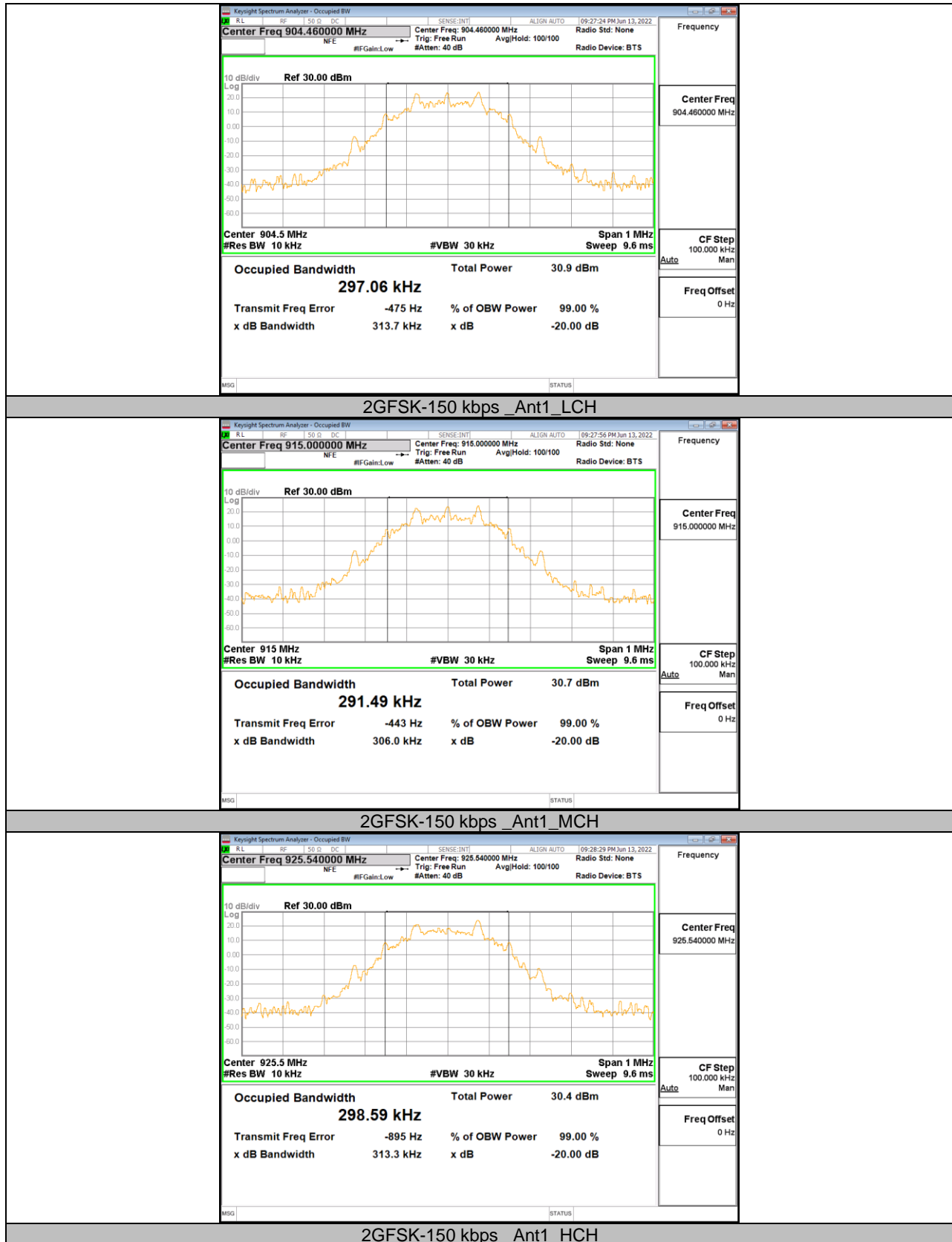
Test Mode	Antenna	Channel	20db EBW[MHz]	OCB [MHz]	Verdict
2GFSK-25 kbps	Ant1	LCH	0.05091	0.04460	PASS
		MCH	0.05091	0.04462	PASS
		HCH	0.05077	0.04450	PASS
2GFSK-75kbps	Ant1	LCH	0.1531	0.1475	PASS
		MCH	0.1513	0.1421	PASS
		HCH	0.1530	0.1484	PASS
2GFSK-150 kbps	Ant1	LCH	0.3137	0.2971	PASS
		MCH	0.3060	0.2915	PASS
		HCH	0.3133	0.2986	PASS
2GFSK-250 kbps	Ant1	LCH	0.4492	0.4200	PASS
		MCH	0.4462	0.4187	PASS
		HCH	0.4441	0.4213	PASS



Test Graphs











APPENDIX C: CONDUCTED OUTPUT POWER

Test Result

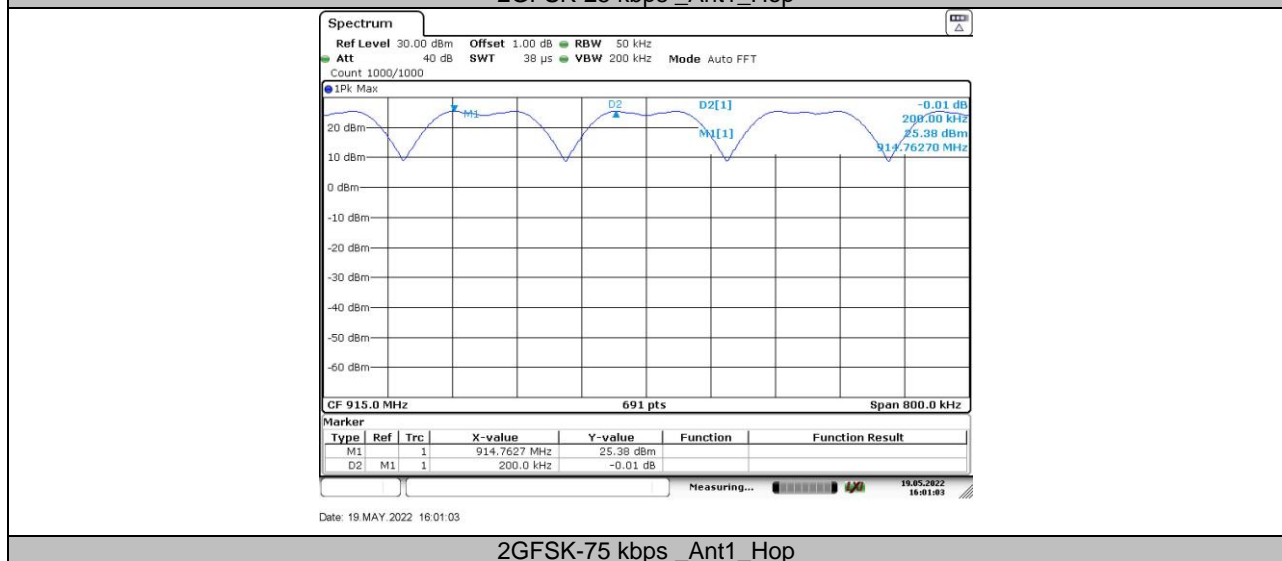
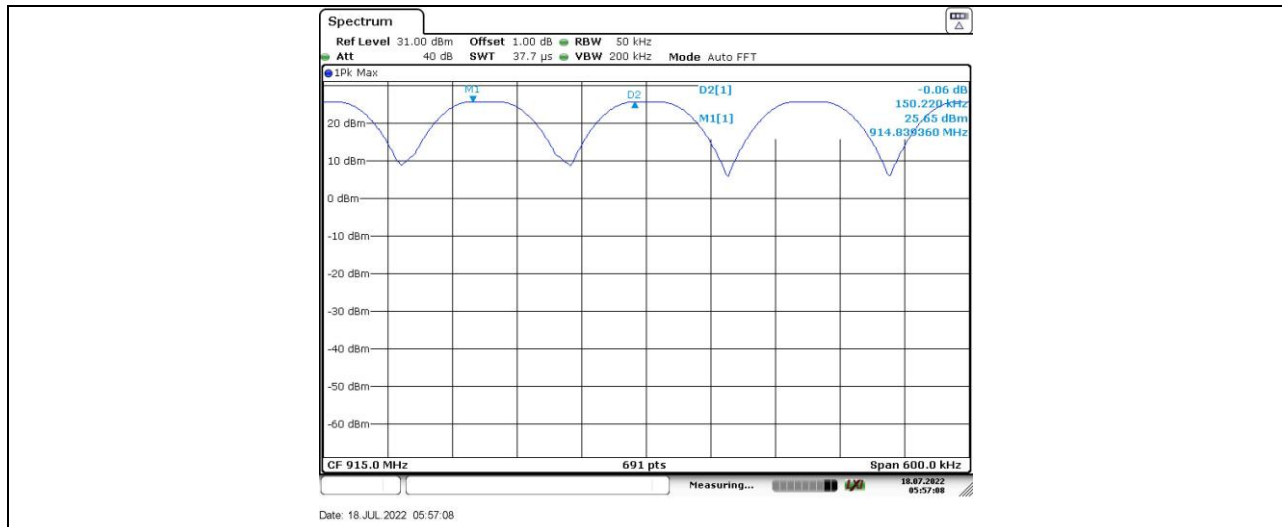
Test Mode	Antenna	Channel	PEAK Result[dBm]	AVG Result[dBm]	Limit[dBm]	Verdict
2GFSK-25 kbps	Ant1	Low	26.32	26.08	≤30	PASS
		Mid	26.32	26.03	≤30	PASS
		High	26.29	26.01	≤30	PASS
2GFSK-75kbps	Ant1	Low	26.35	25.87	≤30	PASS
		Mid	26.33	25.93	≤30	PASS
		High	26.36	25.89	≤30	PASS
2GFSK-150 kbps	Ant1	Low	26.65	26.45	≤30	PASS
		Mid	26.68	26.49	≤30	PASS
		High	26.65	26.43	≤30	PASS
2GFSK-250 kbps	Ant1	Low	26.37	25.97	≤30	PASS
		Mid	26.34	25.89	≤30	PASS
		High	26.33	25.99	≤30	PASS

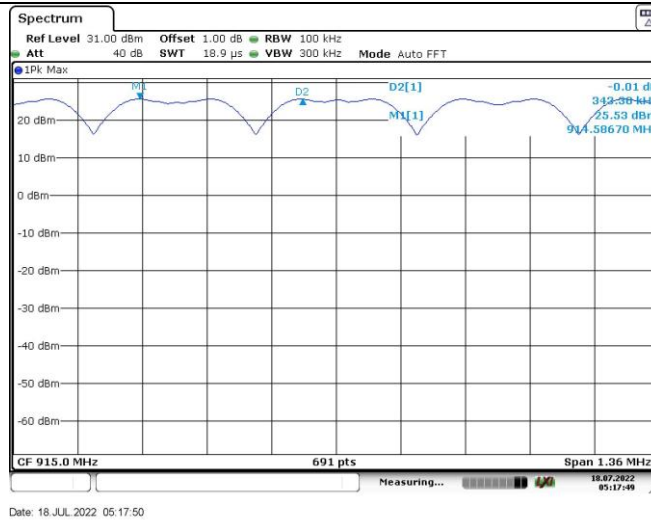


APPENDIX D: CARRIER FREQUENCY SEPARATION

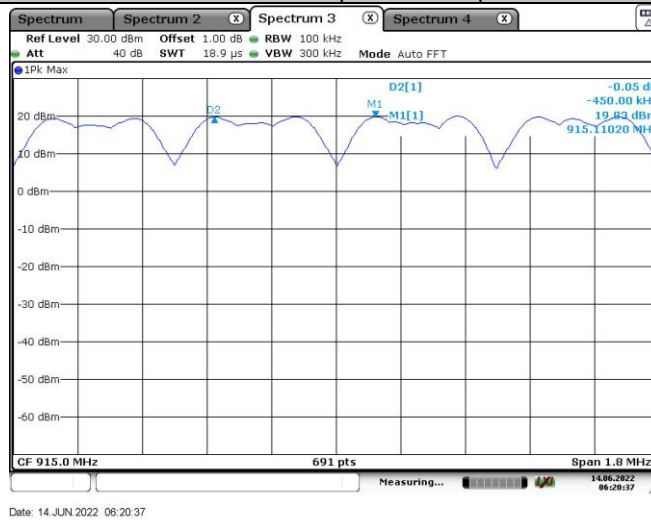
Test Result

Test Mode	Antenna	Channel	Result [MHz]	Limit[MHz]	Verdict
2GFSK-25 kbps	Ant1	Hop	0.150	0.051	PASS
2GFSK-75 kbps	Ant1	Hop	0.200	0.153	PASS
2GFSK-150 kbps	Ant1	Hop	0.343	0.314	PASS
2GFSK-250 kbps	Ant1	Hop	0.450	0.449	PASS





2GFSK-150 kbps_Ant1_Hop



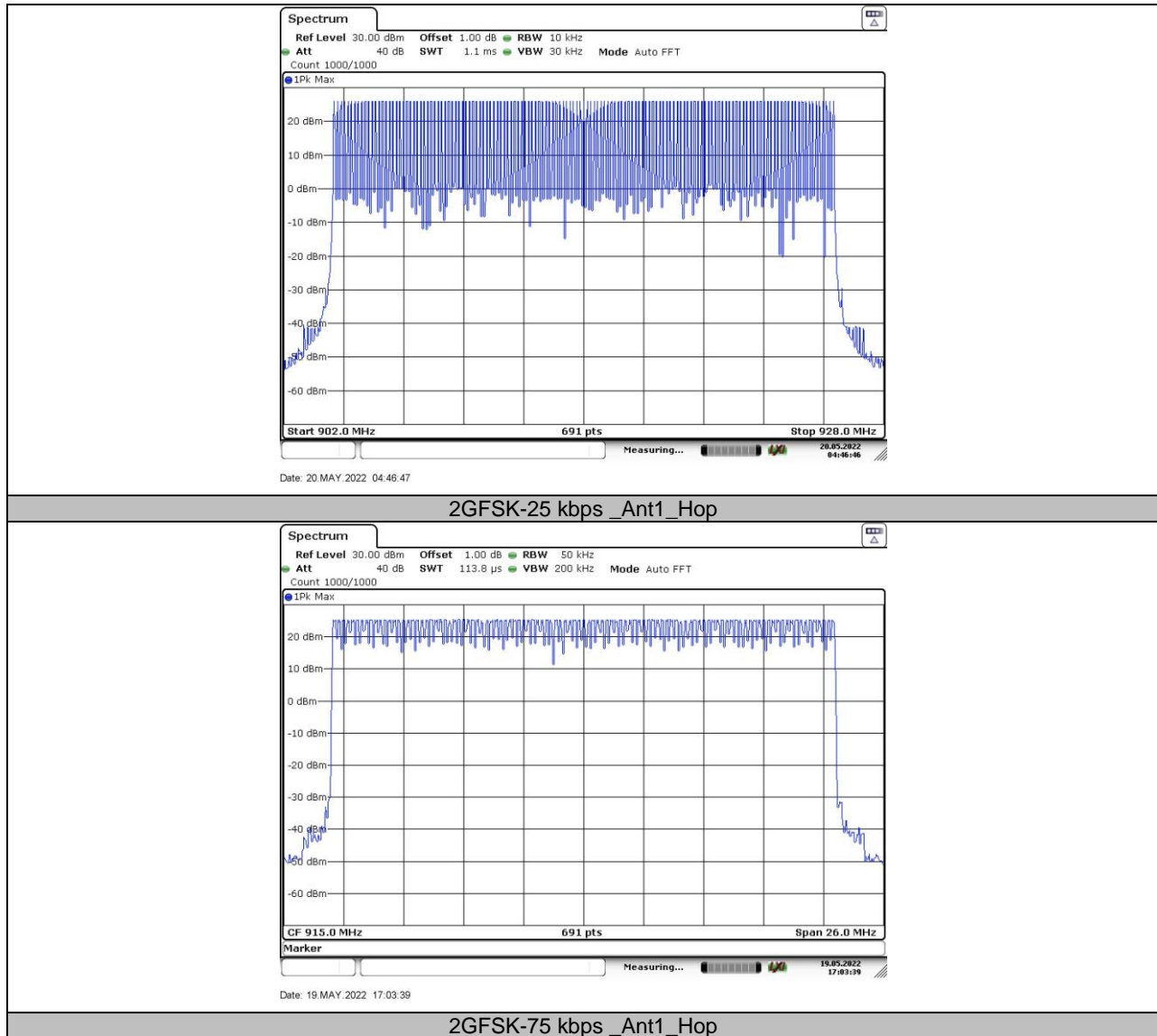
2GFSK-250 kbps_Ant1_Hop

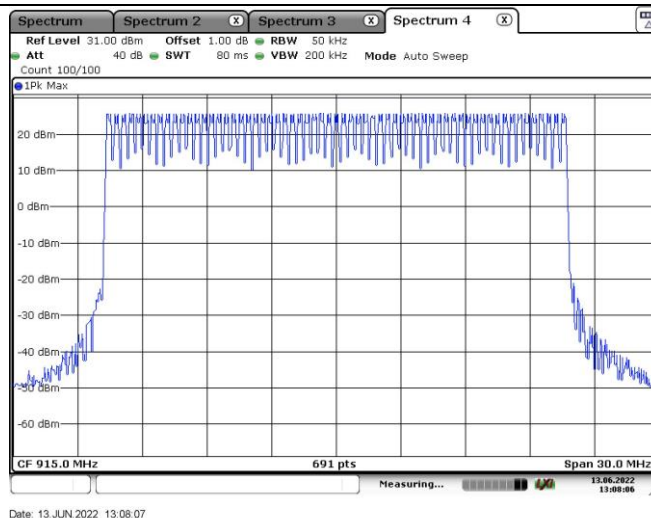
APPENDIX E: NUMBER OF HOPPING FREQUENCIES

Test Result

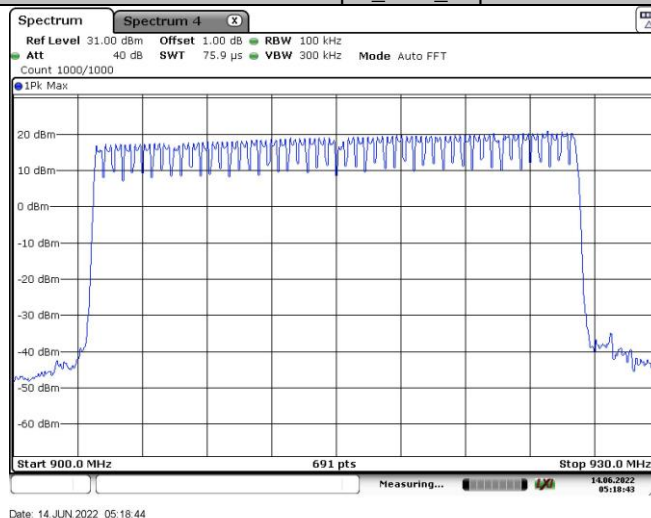
Test Mode	Antenna	Channel	Result[Num]	Limit[Num]	Verdict
2GFSK-25 kbps	Ant1	Hop	145	≥50	PASS
2GFSK-75 kbps	Ant1	Hop	109	≥50	PASS
2GFSK-150 kbps	Ant1	Hop	63	≥25	PASS
2GFSK-250 kbps	Ant1	Hop	50	≥25	PASS

Test Graphs





2GFSK-150 kbps _Ant1_Hop



2GFSK-250 kbps _Ant1_Hop

**APPENDIX F: TIME OF OCCUPANCY (DWELL TIME)****Test Result**

Test Mode	Antenna	Channel	Time of single slot [ms]	number of single slot	Burst Width [ms/hop/ch]	The number of hop channel appear	Dwell Time [ms]	Limit [ms]	Results
2GFSK-25 kbps	Ant1	Hop	53.623	5	268.12	1	268.12	400	PASS
2GFSK-75 kbps	Ant1	Hop	18.116	3	54.35	1	54.35	400	PASS
2GFSK-150 kbps	Ant1	Hop	9.00	3	27.00	1	27.00	400	PASS
2GFSK-250 kbps	Ant1	Hop	5.50	5	27.50	2	55.00	400	PASS

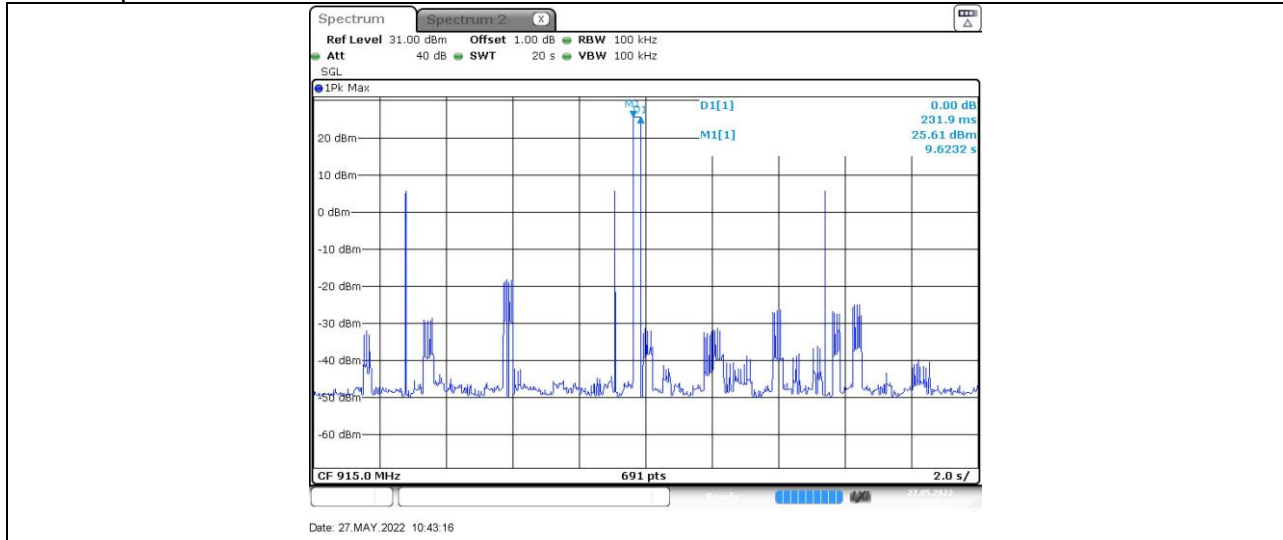
Note:

2GFSK-25 kbps/75 kbps: The dwell time = Time of single slot * The number of hop channel appear within 20s

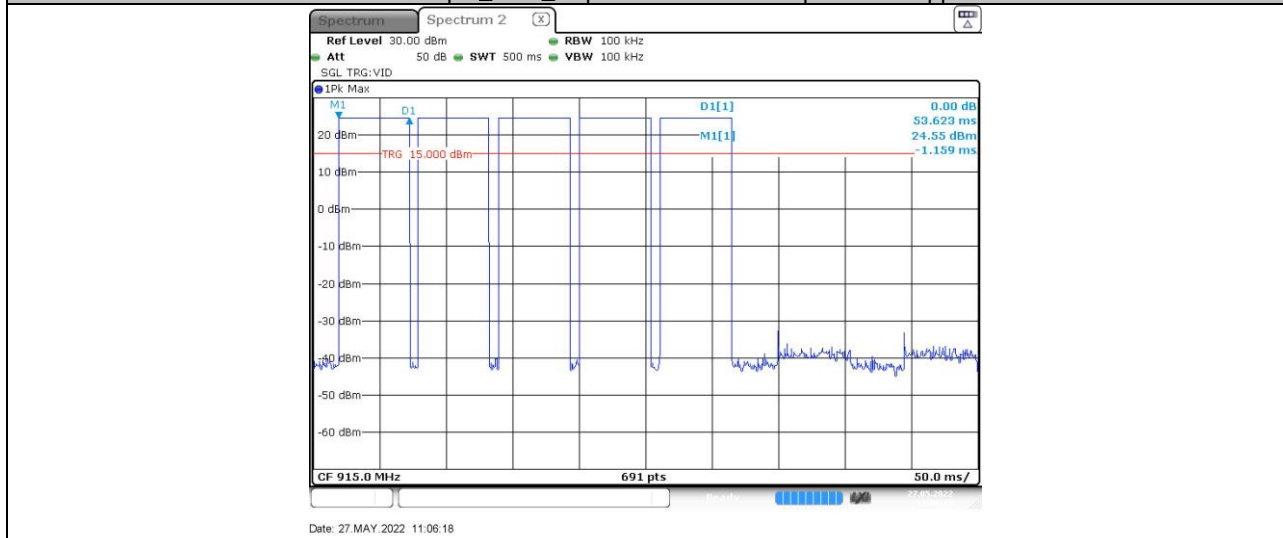
2GFSK-150 kbps/250 kbps: The dwell time = Time of single slot * The number of hop channel appear within 10s

BurstWidth = Time of single slot * number of single slot

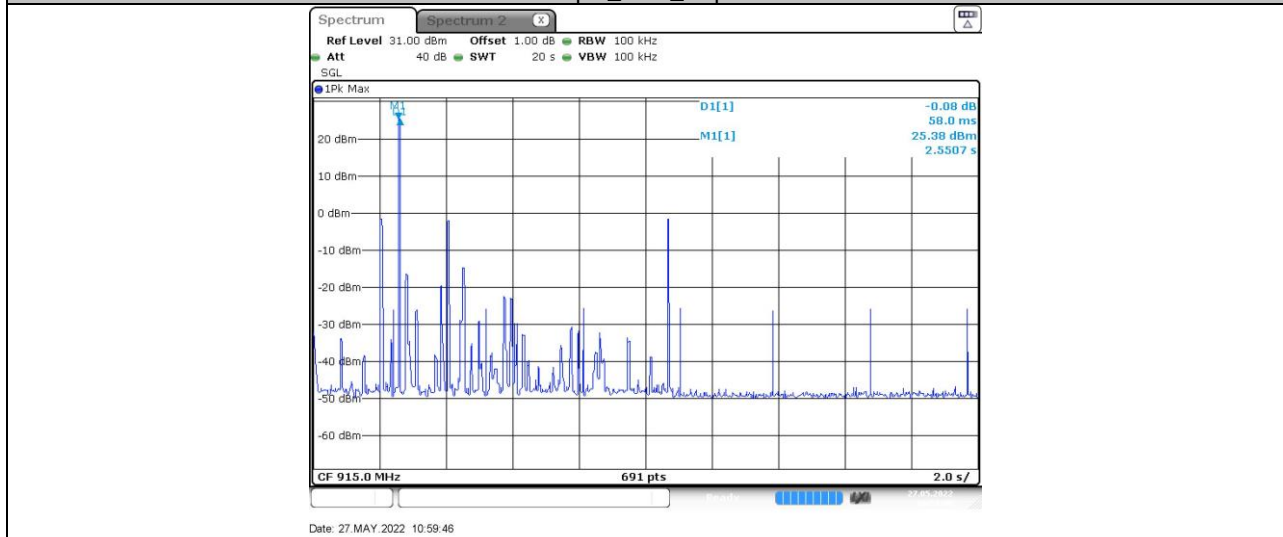
Test Graphs



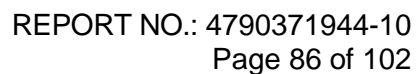
2GFSK-25 kbps_Ant1_Hop- The number of hop channel appear



2GFSK-25 kbps_Ant1_Hop- BurstWidth



2GFSK-75 kbps_Ant1_Hop- The number of hop channel appear



Spectrum | Spectrum 2 | Spectrum 3 | X

Ref Level 31.00 dBm Offset 1.00 dB RBW 100 kHz
 Att 40 dB SWT 10 s VBW 100 kHz

SGL

1Pk Max

20 dBm
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm

M2[1]
M1[1]

-0.20 dB
50.00 mV
18.33 dBm
1.02000

CF 915.0 MHz 1001 pts 1.0 s

Ready

Date: 14 JUN 2022 05:59:46

Spectrum **Spectrum 2** **Spectrum 3**

Ref Level 30.00 dBm **Offset** 1.00 dB **RBW** 100 kHz
Att 40 dB **SWT** 500 ms **VBW** 100 kHz

SGL

1Pk Max

20 dBm
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-60 dBm

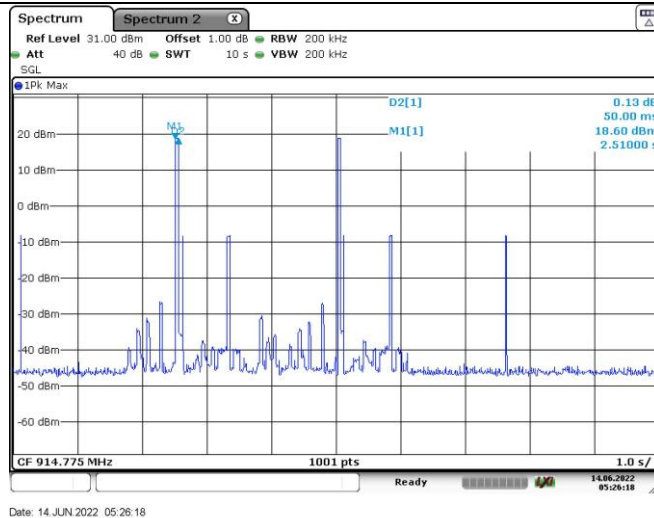
D2[1]
M1
M2

-0.04 dB
9.000 ms
18.24 dBm
289.000 ms

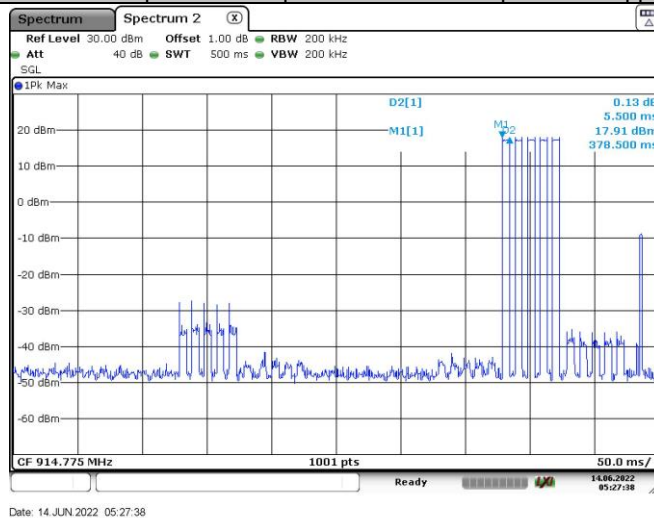
CF 915.0 MHz 1001 pts 50.0 ms/

Ready

Date: 14 JUN 2022 06:00:25



2GFSK-250 kbps _Ant1_Hop- The number of hop channel appear



2GFSK-250 kbps _Ant1_Hop- BurstWidth



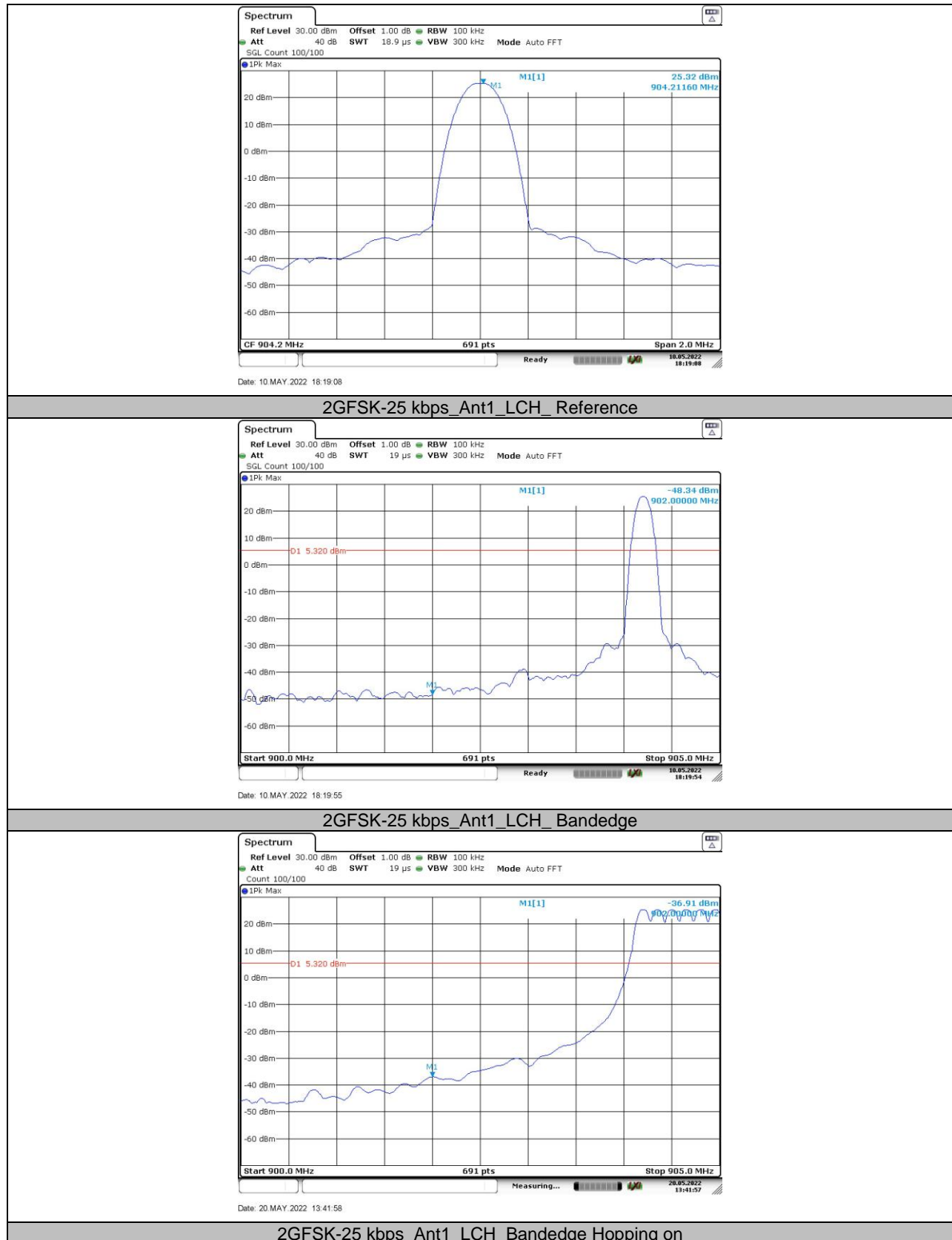
APPENDIX G: CONDUCTED SPURIOUS EMISSION

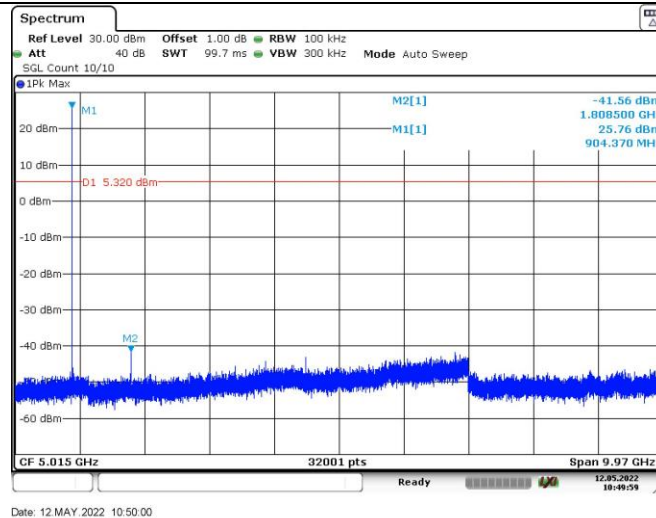
Test Result

Test Mode	Antenna	ChName	Result [dBm]	Verdict
2GFSK-25 kbps	Ant1	Low	See the below graphs	PASS
		High		PASS
		Hop_ Low		PASS
		Hop_ High		PASS
2GFSK-75 kbps	Ant1	Low		PASS
		High		PASS
		Hop_ Low		PASS
		Hop_ High		PASS
2GFSK-150 kbps	Ant1	Low		PASS
		High		PASS
		Hop_ Low		PASS
		Hop_ High		PASS
2GFSK-250 kbps	Ant1	Low		PASS
		High		PASS
		Hop_ Low		PASS
		Hop_ High		PASS



Test Graphs

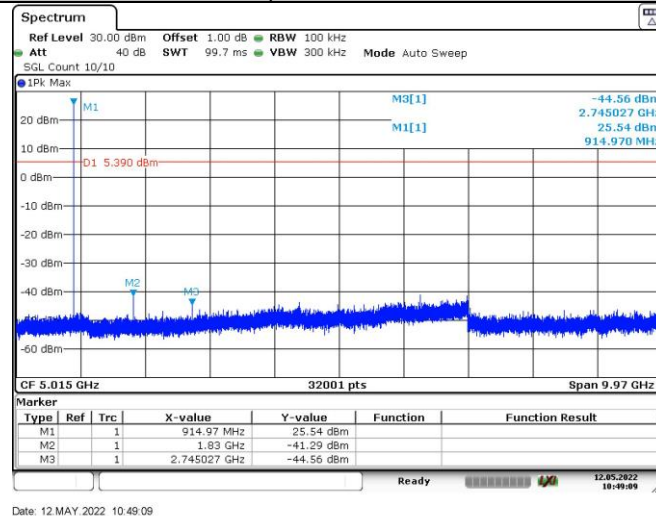




2GFSK-25 kbps_Ant1_LCH_Spurious



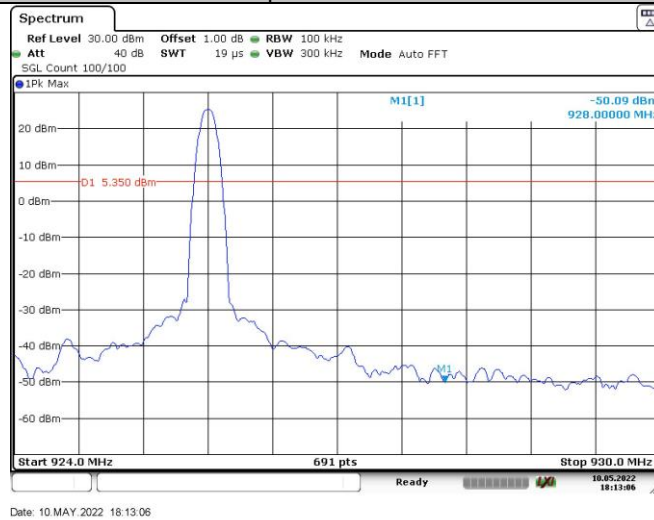
2GFSK-25 kbps_Ant1_MCH_Reference



2GFSK-25 kbps_Ant1_MCH_Spurious



2GFSK-25 kbps_Ant1_HCH_Reference



2GFSK-25 kbps_Ant1_HCH_Bandedge



2GFSK-25 kbps_Ant1_HCH_Bandedge Hopping on